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ABSTRACT

This manual is used in a program designed to provide new Peace Corps volunteers (who have lived in-country for 10 weeks and have had cultural, language, and some forestry technical training) with 5 weeks of intensive training in practical forest technology areas and forest extension work. The manual includes an overview of the program, a list of program goals, information on starting the program (such as selecting training and tree planting sites and planning field trips), lists of references and materials needed, tips on conducting the program, and the complete 64 training sessions. An overview, recommended time-frames, goals, instructional strategies, and exercises are provided for each session. In addition to sessions focusing on such areas as nurseries, tree planting, conducting research on forestry issues, and presenting lessons, language sessions (emphasizing Spanish vocabulary, grammatical structure, and sentence construction) are given regularly to help trainees retain and increase their language skill level. Although each session builds toward or from the one(s) preceding and following it, individual sessions can be used independently with minor modification. (JN)

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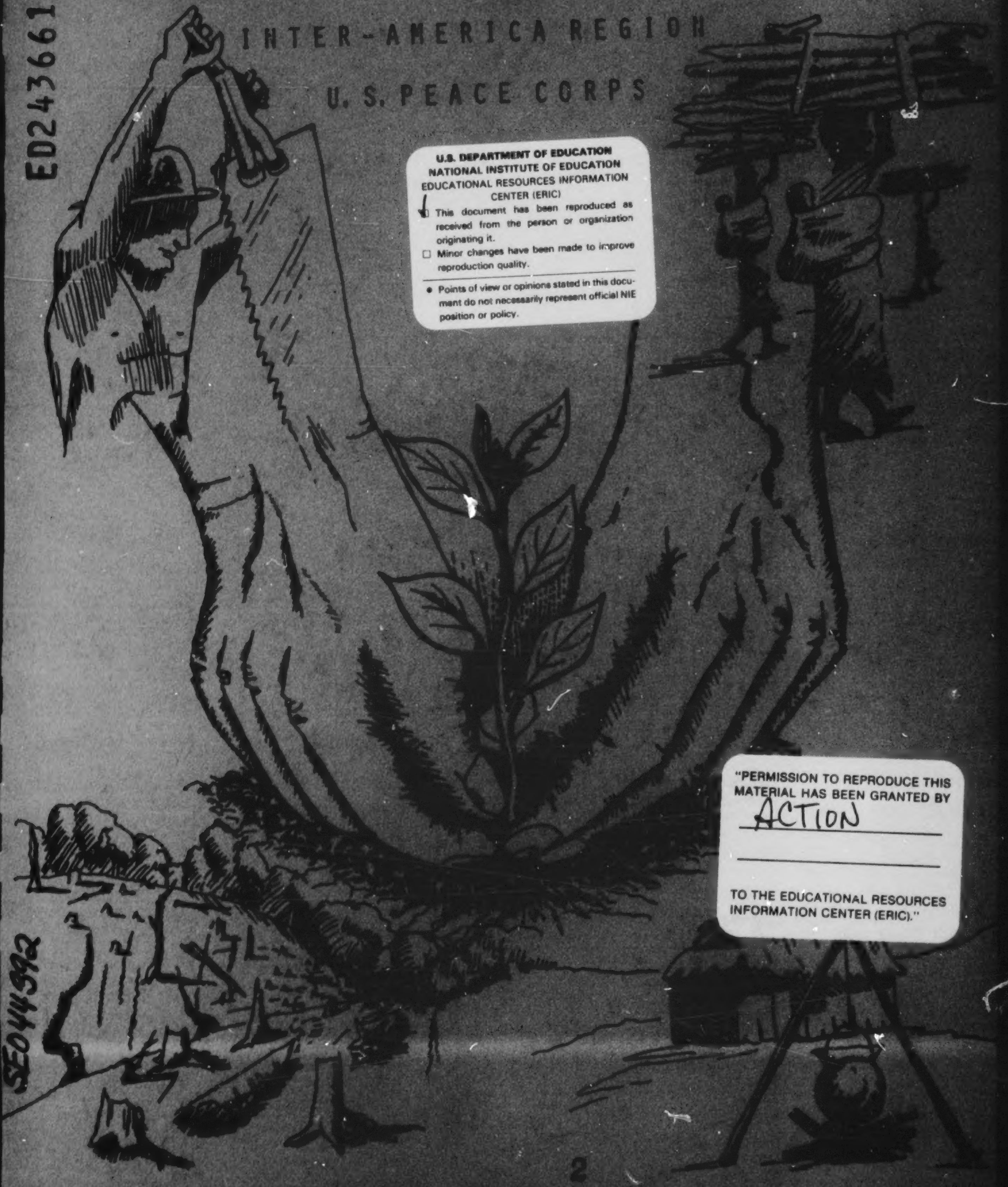
FORESTRY TRAINING MANUAL

INTER-AMERICA REGION

U.S. PEACE CORPS



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FORESTRY TRAINING MANUAL
INTER-AMERICA REGION
U.S. PEACE CORPS

OFFICE OF PROGRAM DEVELOPMENT
FORESTRY/NATURAL RESOURCE SECTOR
PEACE CORPS
AUGUST 1982

ACKNOWLEDGEMENTS

We wish to acknowledge the many contributors in the development of this Inter-America Regional Forestry Training Manual. The initial research for this manual began in June of 1981 with George Mahaffey, Forestry Sector Specialist of the Office of Program Development (OPD) meeting with the programming staffs of Ecuador and Paraguay. Additional research was conducted by the three trainers in the fall of 1981 who finalized the training design. The program staffs of both Ecuador and Paraguay had completed assessments prior to the arrival of the design team. In addition, both the staff of OPD and members of the design team interviewed forestry volunteers in the field, country Peace Corps staff, and host country ministry people concerned with their national forestry programs.

The initial design of this manual was field tested in November/December of 1981 with Forestry trainees from both Paraguay and Ecuador, in Conocoto, Ecuador. Immediately following this pilot program the manual was redesigned based on observations by staff, feedback from trainees and emerged needs. Efforts were taken to make this training program uniform with recently developed OPD trainer guidelines and workshop materials. Our special thanks to Dan Edwards of OPD for making available material still in draft form for our use and to Bo Razak for the layout and format of this manual.

We appreciated the support of John and Ann Heard, Co-Directors of Peace Corps/Paraguay. Our special thanks to Kate Rattery, J.J. Earhart and Tony Dacak of PC/Paraguay for all their help and long hours spent with the forestry staff of OPD and the design team.

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This Inter-America Regional Pre-Service Technical Manual was developed by Joan Bordman, Training Design Consultant; Bruce Burwell, International Forester; Eugene Braun, Trainer Administrator; John Jickling and Mike Braskich, second year forestry Volunteers; with substantive review and revision input from George Mahaffey, Peace Corps Forestry Program Manager, on detail from the National Park Service.

Joan Bordman
Training Design/Manual Consultant
December 1981

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FORESTRY TRAINING MANUAL FOR THE INTER-AMERICA REGION

TRAINER GUIDELINES

This forestry training manual has been developed for use in the countries of the Inter-America Region of Peace Corps. The module or design lends itself to both single country or multi-country use. The design team received from the staff of Peace Corps/Ecuador and Paraguay extensive needs assessments for forestry training in their respective countries. The staff of both countries in turn had input and coordination from the Office of Program Development (OPD). We borrowed the format and some exercises which were modified for use in this forestry training program from the following OPD manuals: Close of Service, Women in Development, In-Service Workshop Module, CAST Module and Multi-Cultural Model.

Each session of this training program builds towards or from the one(s) preceeding and following it. However with minor modification, sessions may be used independently.

The suggestions for timing, location and administration of the workshop are drawn from the results of the field testing done during the training. While the constraints of your setting may require modifying these guidelines, we suggest that special consideration be given to each of these categories so that training programs may be of the greatest benefits to the potential forestry volunteer.

An effort has been made to purge the instructions and materials of excessive training jargon. However, some remain. The trainer may want to further purge the training language if it gets in the way of communicating with the participants. It is hoped that the language and instructions in this manual facilitates a successful presentation of a forestry training program.

FORESTRY TRAINING MANUAL FOR THE INTER-AMERICA REGION

TRAINING PROGRAM OVERVIEW

The general purpose of this training program is to prepare new in-country Peace Corps Forestry Volunteers who have lived in-country for 10 weeks and have had cultural training, language training and have experienced some forestry technical training (i.e., local species identification) and give them 5 weeks of intensive training in forest technology "hands on". This "hands on" training is designed to build confidence in technical areas and forest extension work. This training program continues to build on learnings from Staging/CREST/CAST and in-country training in the area of communication skills building, cultural awareness, community development, and the role of the volunteer. The technical training is directed at the introductions and beginning "hands on" rather than carved "how to's".

Throughout testing the pilot, participants exhibited anxiety about the communication exercises, cultural awareness exercises and community analysis (which they perceived as "sociology"). It had to be explained many times that the skills necessary to work in communities had to be practiced and the more skillful at communication, group process, and community analysis the more effective they would be as volunteers. Technical skills alone were not enough without the ability to transfer these skills to another person. The discomfort with the feelings that are associated with human interaction skills are for the most part lack of awareness rather than insensitivity to the needs on the part of the trainees.

The introduction to practical forestry technology starts with the establishment of a "vivero" (nursery) that trainees complete on the training site. Practice in handling, transporting and actual tree planting are also a part of the "hands on" thrust of the technical part of training. Trainees learn how to pace, measure and survey. They take on special projects such as, plane table building, rustic transit assembling, compost heap start-up, making of a Biltmore Stick, etc. In turn trainees who have taken on special projects teach that skill to the other trainees. In the technical aspects of training, participants conduct research and prepare reports on forestry issues. They prepare agro-forestry plans for their sites and participate in species identification projects. At the end of training all reports and write-ups are made into a forestry handbook for the participants to have during their service.

Starting in the second week of training and continuing through the third week, participants conduct some sessions and are responsible for certain exercises, i.e., making a diameter tape, compost heap, insect collection, lesson plans, etc. This provides trainees with experience in making presentations, skill transference and assuming responsibility.

A week long field trip is conducted during the fourth week of training. The purpose of this field trip is to give trainees practice in forest extension using techniques discussed in the training exercises. This is acccomplished by visiting small farmers and/or colonists, and trying to interest them in forestry projects. There is also reinforcement of learnings in setting up a nursery by visiting several established nurseries and observing and learning applicable/relevant techniques. Further, trainees become acquainted first hand with different species and the environmental niche they occupy in the forest.

Trainees also observe the effects of deforestation, along with the advantages and disadvantages of large scale exotic plantations. Trainees will observe agricultural crops and see their potential benefits to agro-forestry projects. During and after field exercises, trainees discuss their observations and compare them to anticipated conditions at their Peace Corps service sites.

During the fifth week, emphasis is placed on technical planning which will be undertaken by the volunteer at his/her work site. Specific forestry techniques such as fruit tree grafting, insect collection, and resource identification are stressed. Further attention is focused on cultural shock and communications with counterparts and host country officials through the use of role playing.

In implementing the sequence of technical and interactions training, it is important that participants understand that the initial review of the technical aspects of forestry will be new to some of them. For those who are knowledgeable in the technical components of forestry, it is an opportunity to help others understand and practice transferring skills.

The identification and practice of skills developed and areas of personal growth will be useful in their role as Peace Corps Volunteers. The identification of areas of accomplishment may also be used in the process. Consideration of topics such as the "Role of the Peace Corps Volunteer in Forestry Extension Work" may stimulate thoughts that could find practical application in their work.

Language sessions are given regularly during training so that trainees do not lose their language skills. These sessions, both technical and general, emphasize vocabulary, grammatical structure, and sentence construction. Conversational Spanish is spoken at meal time and during sessions. The purpose of these sessions, along with helping trainees retain their language capabilities, is to increase their language skill level during technical training.

Finally participants are made aware from the first session that they are responsible for their own learnings. What we have done in this training program is to provide the opportunity for their educational enhancement. It is not possible to develop a training program specific to every site where volunteers will be placed, and it is therefore up to the volunteer to couple his/her training with knowledge they have about their work site, thereby making their learnings specific to their sites.

TRAINING PROGRAM GOALS:

The design of the forestry training program is such that upon completion, the volunteer will be provided technical information, knowledge and skills - facilitating productive and satisfying Peace Corps Volunteer service.

Specific training program goals are:

1. To enable participants to recognize their skills and to feel competent in the use of these skills.
2. To teach trainees how to transfer the technical skills they have to others.
3. To identify and improve skill areas that need strengthening.
4. For trainees to understand their role as Peace Corps forestry volunteers in the host country.
5. To help trainees identify and find resources available to them in their community sites and host country agencies.

6. For trainees to research species of trees and know where to find information on identifying species both indigenous and exotic.
7. For trainees to know how to develop and write-up small research projects, etc., related to forestry in host country.
8. The illustration of competency in forestry techniques in planting, thinning, pruning, pacing and measuring trees and stands of trees, grafting and other techniques necessary to forestry.
9. Ability to analyze properly communities' social systems, which should identify problems and help communities seek solutions.
10. Illustration of competency in establishing a tree nursery. This includes site location, planning, layout, soil preparation, sowing of seed, outplanting and maintenance.
11. An understanding of the basic theories of forestry extension work.
12. Increased fluency and improved usage of the Spanish language.
13. Increased interpersonal, team building and communication skills.
14. A better understanding of global and country specific forestry issues.

Objectives and activities for each session will be described at the beginning of each session.

1.1. Advance Information

It is critical that trainees be given the data collection guidelines on the following page form as they go on their 10-day to two week site visits prior to coming to the technical training program. The information which they are asked to gather during their site visits will be used during the course of training.

It is assumed that the in-country training centers responsible for language and cultural training will also offer some preliminary forestry sessions, i.e., host country specific information, tree species, climatic conditions, host country forestry law, local resources and Peace Corps forestry goals and experience in host country.

The country training center should also make it clear to trainees that the technical training program will:

1. be intense (little free time);
2. entail a great deal of study, research and writing;
3. continue to build on cross cultural skills;
4. continue language training;
5. teach technical skills;
6. be experiential, hands on training;
7. highlight and improve their inter-personal skills.

In some cases, training centers may want to give basic courses to generalists to form a more homogeneous training group. These courses could include forest botany, forestry terminology and simple forestry techniques (using an ax, saw, basic tools).

Forestry Observation Guide for Site Visit

While at your site, please gather and record information on the following;

1. Climatic Data (local beliefs and official information)
    - a. Rainfall
    - b. Temperature
    - c. Problems; frequency and seriousness
      Frost? Hail? Drought?
2. Uses of forest products
    - a. Local uses - prices
    - b. Commercial uses - prices
3. Forest problems
4. Local attitudes and/or traditions related to trees or forests
5. The ten most common trees - local and/or scientific names
6. Agricultural crops that are grown that might have agro-forestry potential
7. Fruit trees
8. Soil
    - a. General soil types
    - b. Erosion problems
    - c. Attempts at erosion control
9. Land tenure
    - a. Ownership patterns
    - b. Size of holdings
10. Animals (wild and domestic) and their influence on forestry
11. Measurements and equivalents
    - a. Local land area measurements
    - b. Local distance measurements
    - c. Forest product measurements

12. Local power structure

13. What aspects of forestry with potential for small practical research project for PCVs need more careful study?

GETTING READY

There are several preparatory steps that must be taken in order to get ready for the actual training program.

On being well prepared, we offer the following suggestions concerning materials and their distribution and descriptions of possible training sites or session sites which will assist in managing staff time and handling the administrative aspects of forestry training programs.

1. Stock the Library

Several good books and sets of reference materials are needed as library stock. Select materials which will aid trainees in research paper development, agro-forestry planning, and species identification. Further, incorporate a few manuals and research papers that you think will be of general interest. Putting together the library is perhaps the most difficult of all preliminary tasks. You will find that you have few friends and fewer resources when it comes to borrowing books, papers and manuals.

After you have collected all your materials for the library, list them and make 3" X 5" index cards with the title and author of each item, and state if it is a book, manual, paper, etc.

SAMPLE CARD

LEUCAENA -PROMISING
Foreage and Tree Crop
for the Tropics

Name	**Author**
1.	
2.	
3.	
4.	
5.	
6.	

The appropriate card is attached with paper clip to each piece of reference material. As they are checked out, cards are placed in a box provided for that purpose.

Setting up the library is a day long project for one trainee. After materials are carded and listed, they should be placed on a series of tables that makes them easy to see and thereby determine what materials are available. The library should also have tables and chairs for trainees to study.

Included below is a sample list of reference materials we used in Ecuador. This list is not exhaustive by any means.

REFERENCE MATERIAL LISTING

1. LEUCAENA - Promising Forage and Tree Crop for the Tropics.
2. Underexploited Tropical Plants with Promising Economic Value.
3. Forest Activities and Deforestation Problems in Developing Countries.
4. Special Readings in Conservation. FAO #4.
5. Trees Yearbook of Agriculture. 1949.
6. Forest Products in Terms of Metric Units.
7. The Natural Occurrence of the Eucalyptus.
8. Irrigation Principles and Practices.
9. Plant Communities.
10. Forestry Handbook.
11. Conservation of Tropical Moist Forests.
12. Establishment Techniques for Forest Plantations. FAO #8.
13. Technological Opportunities for Tropical Forestry Development.
14. El Eucalipto en el Ecuador.
15. Geografica y Ecologia de las Tierras Aridas del Ecuador.

16. Tropical Legumes -Resources for the Future.
17. An Introduction to Plant Taxonomy.
18. Pinus Radiata, Growth and Economics.
19. Pinus Radiata, August, 1970 Proceedings Volume I.
20. The Use of Ecological Guidelines for Development in the American Humid Tropics.
21. Pinus Radiata. August 1970. Volume II.
22. Road to Survival.
23. The Process of Communication.
24. Sturdy Statistics.
25. Firewood Crops.
26. Guía Forestal Para la Cuenca del Rio Jabones (2).
27. El Ultimo Informe Sobre la Fase I.
28. Ministerio de Agricultura y Ganaderia.
29. El Programa "Alamo".
30. Guía de Los Ensayos de las Especies Forestales.
31. Informe de Evaluación de las Especies Forestales Exoticas de Los Ensayos de Introduction.
32. Investigación Forestal con Especies Exoticas en Azuay.
33. Results of Exotic Tree Species Trails in Southern Ecuador.
34. Informed Sobre El Bosque Experimental del Ministerio del Agricultura en los Salesianos.
35. Plano Basico y Guía Para Ensayos de Especies Exoticas de Arboles en Azuay, Canar y Morona Santiago, Fase II.
36. La conclusión de los datos del Cuerpo de Paz de Las Especies Exoticas en Las Provincais del Azuay y Canar (1969 - 78).
37. Informe de Evaluacion del Experimento de Fertilization y de Especies Exoticas (2) de 1975.
38. Recomendaciones de Asuntos Forestales en la Cuenca del Rio Jubones.
39. Evaluación del Experimento de Fertilizacion de 1975.
40. Green Folder.
41. T. Guerrero (B1.1 (B2.1) (B.3.1).
42. Informes Forestales - 1977.
43. N.R. Plots.
44. Paraguay -Classificación y uso Apropiado de la Tierra en el Area del Proyecto de Desarrollo Rural Itapua.
45. Bibliography of the Soils of the Tropics. Volume III.
46. Guide for Field Crops in the Tropics and the Subtropics.
47. Paraguay - Una Estrategia de Desarrollo para el Sector Forestal del Paraguay.
48. Paraguay - Algunos Criterios Sobre el Manejo de los Recursos Naturales Renovables.
49. NRDC Tropical Moist Forests Conservation Bulletin.
50. Paraguay - Documento de Trabajo. No. 23 (2).
51. Paraguay - Documento de Trabajo No. 19.
52. Paraguay - Una Estrategia de Desarrollo para el Sector Forestal de Paraguay.
53. Paraguay - Clasificación y uso Apropiado de la Tierra en el area del proyecto de desarrollo Rural Itapua.
54. Legislación y Administración Forestal.
55. Section Three - Cooperative Organization.
56. Section Five - Cooperative Education and Training.
57. Arboles Arbustos del Paraguay.
59. Suelos Forestales.
60. Curso de conservación de la Naturaleza y sus Recursos Renovables.

61. Proposición para la Expansión del Programa Nacional de Capacitación de Orbreros Forestales.
62. Situación Actual y Plan de Desarrollo 1980 - 1984 Subsector Forestal.
63. Leucaena - Centro de Capacitación e Investigación Forestal de Conocoto. Febrero -1981.
64. Sistemas Silviculturales y Metodos de Reproduccion.
65. Determinación de Zonas de Vida.
66. Firewood Crops.
67. Common Trees of Puerto Rico & the Virgin Islands.
68. Workshop - Agro-Forestry Systems in Latin America.
69. World Watch Paper 26. Planting for the Future: Forestry for Human Needs.
70. Los Bosques del Ecuador y Sus Productos.
71. Teaching Conservation in Developing Nations.
72. Intensive Vegetable Gardening.
73. Tropical Legumes: Resources for the Future.
74. Trees of Puerto Rico and the Virgin Islands.
75. Understand the Game of the Environment.
76. Taller: Sistemas Agroforestales en America Latina.
77. The Socio-Economic Context of Fuelwood Use in Small Rural Communities.
78. Reforestation in Agro Lands.
79. Proceedings of the U.S. Stregety Conference on Tropical Deforestation.
80. Agricultural Extension.
81. Papers for Conference on Improved Utilization of Tropical Forests.
82. Biological & Sociological Basis for a Rational Use of Forest Resources for Energy & Organics.
83. Forestry For Rural Communities.
84. Forestry for Rural Communities.
85. Workshop. Agroforestry Systems in Latin America.
86. Elementary Forest Surveying & Mapping.
87. Arboles de Costa Rico Vol. I.
88. Elementary Forest Surveying & Mapping.
89. Log Scaling and Timber Cruising.
90. New Crops for the New World.
91. A Glossary of Agricultural Terms.
92. Tree Planters' Notes. Volume 31. No. 4. 1980.
93. Luecaena - Promising Forage and Tree Crops for the Tropics.
94. Manual de Cooperativas Agricolas.
95. Unasylva - Volume 31 No. 126. 1979.
96. Unasylva - Volume 31 No. 123. 1979.
97. The Cost of Scaling & Upgrading hardwood Sawlogs.
98. Air Drying of Timber.
99. Soils and Crops. 12th Edition.
100. Agricultural Program Manual - The Case for Assisting The Small Scale Farmer in Latin America.
101. Dry Kiln - Operator's Manual.
102. Reforestation in Arid Lands.
103. Economic Plants of Interest to the Americas.
104. Permanent Logging Roads for Better Woodlot Management.
105. Simplified Guidelines to Hardwood Lumber Grading.
106. Outdoor Classrooms on School Sites.
107. Environmental Education in Action.

108. Tree Planters' Notes. Volume 31. No. 2. 1980.
109. Ayuda Bilateral Britanica en Ecuador. Informe #4. Breves Notas en Tecnicas de Viveros Forestalis en La Sierra del Ecuador en 1973.
110. Ayuda Bilateral Britanica. Mota Tecnica #10. Densidad de Siembra del Pinus Radiata.
111. Potencial de la Madera como Combustible: Renovacion.
112. War on Hunger.

2. The Training Site

If possible use the host country forestry school when it is not otherwise occupied with students conducting their own courses. The following considerations should be taken into account when selecting a technical training site:

1. Land for establishing a vivero (nursery);
2. Potting shed with soil for transplanting;
3. Seedlings to be outplanted;
4. Several stands of trees to measure and a stand of trees for pruning and thinning practice;
5. Seeds for outplanting;
6. Seed storage facilities;
7. Classrooms;
8. A dormitory and cafeteria that will provide housing and meals;
9. A library in addition to the one you have set up;
10. Several employees who trainees can talk to about on-going activities at school;
11. Research projects, tasks and sites relevent to trainees;
12. Recreation facilities, i.e., basketball court, soccer field, pool table, ping pong.

In choosing the training site it is important to remember that the focus of the training program is on participant learning. Volunteers should not have to cope with a physical environment that needs a great deal of managing during the training cycle. A certain amount of privacy, running water, electricity and bottled drinking water are minimal requirements. Outdoor recreation areas are also desirable for participants. If you are unable to use a forestry school, you will then have to use a training site that is close to or can provide items one through seven and number 11 outlined in the training site considerations.

Another benefit of using the host country forestry school is that it ties the Ministry into the training program. We were able to have the Ecuadorian Ministry of Agriculture issue a Certificate of Completion to each participant. This certificate showed Ministry cooperation with and approval of the training. It is also beneficial if participants exhibit their certificates at their work sites as this enhances his/her credibility and acceptance by the community.

3. Plan the Field Trip

First, determine the kind of area and project you want trainees to see and possibly emulate as Peace Corps volunteers. This is an opportunity to point out the problems of deforestation, soil erosion, and poor range management. It is also an opportunity to point out indigenous and exotic species in the host country. After brainstorming the options you have, pick out the ones that will, in your opinion, benefit the trainees most. Further, the field trip(s) provides a good chance to introduce trainees to a number of host country forestry officials in the field and to practice being extension workers. If you are going to have participants practice extension work, it is imperative that you investigate the site and then work closely with the volunteers on the field trip. We don't want to initiate something that will have no follow-up.

Develop a list of field trip objectives after you have decided where and why you want to go to that site or project. The list should be given to the trainees just prior to the field trips which are scheduled during the fourth week of training.

Now that you know where you are going and why, you need to make arrangements and appointments with various people who you will want to see and talk with during the field trip. Personal contact with follow-up letters reemphasizing the trip itinerary and purpose proves to be the best way of assuring arrangements. It is also good to include with the letter a copy of the schedule if available.

Prepare and provide a daily schedule of events for each participant. You will need to make living arrangements nearest your first appointment for the following morning for yourself and the participants. Be careful in the planning of your daily trips that you do not end up spending 75% of your time riding the bus.

Finally, have a bus big enough for trainees, other participants and luggage. The bus company will need to know your route and stopovers.

4. Tree Planting Site

During the course of training, participants will plant trees. We found a local orphanage that needed trees planted to provide a privacy screen. This site was ideal for our purposes;

it not only provided participants an opportunity to work with the children but also taught them as well as the children how to plant trees. Since this exercise must be viewed as a donation of trees and labor from Peace Corps an appropriate institution or organization should be sought for receipt of this donation. An orphanage or grade school is ideal as these institutions are usually non-political. Generally, schools have a need for trees either as privacy screen, wind breaks or fencing.

5. Soil Erosion Site

In the immediate area of the training site an example of soil erosion should be found. You are looking for gullies forming as a result of water erosion that can accomodate gully plugs. Trainees will need to install gulley plugs and examine indigenous vegetation in the area to see if plants, shrubs, etc., have established themselves naturally and could be used as a deterrent to further erosion. Remember to contact the land owner for permission to install gully plugs.

6. Transportation

It is possible that you will need bus transportation daily to take trainees to technical sessions as well as to tree planting and soil erosion sites. You will need at least one bus for the field trip and possibly two if the training group splits up as was the case in the pilot training program. Depending on the availability of stands of trees for various exercises, you may also need more transportation. Remember the more spread out training sites are the more transportation you will need.

7. Materials

The following is a list of the minimal materials you will need during this training program.

ball point pens*
blotter paper
bolt 6 cm long with wing nut
candy bars
clear rulers*
common pins
crayons
felt pieces
flip charts
glass bottles
glue
graph paper
5x7 index cards
lined paper*
loose leaf binders*
marker pens
masking tape
nails
newspaper
newsprint
old magazines
plain white paper*
plastic bags
primary saws
protractor*
rakes
rubber bands
scissors
scraps of material
seedlings
seeds (20 varieties)
shovels
stakes
staples
string
survey flagging - red
waterproof pens
wing nut 6cm long
board 1 meter long X 5 cm wide or 1 or 2 cm thick (Biltmore Stick making)*
board 4 cm (h) X 3 cm (w) x 2 cm (l)
board 1 meter long X 1 meter wide (Plane table)
pole 2 cm long (bamboo is good)
small piece of wood 2 cm (h) X 4 cm (w) X 40 cm (l)
measuring tape 3 meters long*

*Indicates one for each participant

CONDUCTING THE TRAINING PROGRAM

Timing

This training program comes at the end of in-country cross cultural training. It is scheduled at this time so that the volunteer gets exposure to the culture and people of host country and some familiarity with the conditions present at his/her work site.

Location

As stated in a previous section, when planning ahead the setting for training is important. A center located in the countryside is important not only because that is where forest land is most likely to be found, but because it cuts down on having to contend with trainees wanting to do other things, i.e., going to movies, dancing, etc. In other words, the country has minimum distractions.

Available time is limited during the training. In selecting a site consider as critical, the "time lost factor" in taking care of life activities such as getting food, bathing and sleeping. The atmosphere of the training site directly effects participants' attitude. If they have to spend time coping with the facilities, they are less likely to spend time productively during training.

Group Size

There should not be less than 12 people in the training program. In countries where there are less than twelve people in the forestry training program they may want to decide on combining with another country with similar geographic and climatic conditions and similar skill needs to save on the cost of training. If the group size is small the program becomes "incestuous." If the group size is too large, the facilitators do not have enough time during sessions to offer individual assistance, especially for the sessions identifying communication skills, technical skills and "hands on" activities. Preferred group size should not exceed 25 people. Should the training component exceed 25 participants you will need to allocate a co-trainer for every trainer.

Trainers/Facilitators

This program requires one well rounded, experienced forestry technical trainer, one human interaction trainer and one administrative/technical trainer. If more than one country is involved an additional co-trainer from the country where the training is not to be held should be added to the staff. During the field trips second year forestry volunteers are included as co-trainers.

Sometimes during the small group activities several of the small groups will need the assistance of a facilitator, especially if the group is having difficulty. Once an activity is explained and the exercise begins, the facilitator "floats" from group to group to check that the activity is moving smoothly and if help is necessary. One person cannot cover all groups effectively. It is essential to have the support of another facilitator for redesign, sharing the load and providing alternatives to handling problem situations.

The trainers are the key to the training program. They create the atmosphere, set the tone and help participants achieve maximum benefit from the activities. However in the introductory session, the facilitators should make clear to the participants that each person gets out of this program whatever they put into it.

Sessions

As part of the "tone" it is important to give a clear but concise overview of the training program - what we're doing, where we're going, and why - and while conducting the session take a few minutes to explain an exercise - the direction of the exercise and how volunteers will benefit from it. We have included notes to show you how to do this.

Materials

In the previous section on "Getting Ready" we have included a long list of materials covering the 5-week long training program. At the beginning of each session there is a materials list which you should have ready before the session begins. As there are a great many materials and tools, we suggest that one trainer be in charge of all materials to see that they are not lost and that supplies are maintained and provided for each session. Also there is the one trainer that participants go to when they need materials for special projects.

Journals/Handouts

There is a minimum of handouts trainees receive. Following is a list of those handouts:

Overall training design schedule,
Weekly schedule,
Evaluation criteria/weekly evaluation form,
Schedule of due dates on special projects,
Technical papers and pamphlets,

In addition notebooks used for personal journals offer the participant a chance to record thoughts, insights, learnings, technical data or notes that he/she finds relevant and useful. Participants should be provided an opportunity at the end of each day to write in his/her journal.

Sharing

Many of the activities involve sharing with a partner or a small group. You may be asked "Why so much sharing?" A response is that sometimes you get a different perspective about an idea or thought when you verbalize it or hear it repeated back from other people. The purpose of sharing is to add dimensions - trying to help people "stretch" and to get help and suggestions from one another.

It is up to the facilitator to create an atmosphere of trust and non-judgement that will encourage people to feel free to express themselves. In any case, early in the training process, the facilitator encourages people to share with each other, but only to the degree that each is willing to share.

Weekly Evaluation

As a way of determining the progress of training and obtaining information regarding necessary design adjustments or problem areas, some form of a weekly evaluation should be conducted. One way is to ask the participants to respond in writing to the weekly evaluation form on the following page.

WEEKLY EVALUATION FORM

Date:______________ Name:_________________

1. I have gained the following______________________________
____
____
____
____

2. On a scale of 1 to 10 my learning this week has been a.___________________________
____
____

3. This week has been (respond to all that applies):

____Informative
____A rehash
____Motivating
____Stretching
____Too much in too little time
____Unnecessary
____Valuable
____A waste of time
____A stone drag

4. This week has (respond to all that applies)

____Challenged me
____Reinforced my technical skills
____Made me more confident
____Enabled me to polish communication skills
____Improved my group interaction skills

5. Feedback on the training program

6. Feedback to Trainers

7. Things I would like to see included in training program

Staff Meetings

It is important for trainers and co-trainers to meet daily. We found that the time when participants were occupied with Spanish classes was best. The following is a suggested agenda:

1. How have sessions gone since we last met?
2. Are we ready for next sessions?
3. What kind of help do we need?
4. Any participants we are concerned about?
5. Any feedback for each other?
6. Role clarification for trainers.

The day before personal interviews staff meetings tend to run longer as staff decides on feedback for each trainee/participant. It is important that staff have consensus on feedback they provide to each trainee.

Presenting the Sessions

Format

Each session design includes one or more exercises directed at the goals of the session. The information provided in the design includes:

1. Session/Exercise Title,
2. Total time required to complete session/exercise
3. Overview statement describing purpose of session/exercise,
4. Procedure and activities - sequenced and timed steps which describe what trainer and participants are required to do at a particular point in the program,
5. Material required,
6. Trainer Notes: Special instructions relevant to a particular session or exercise.

Review/Study the Training Program Guidelines

Even though each session is described in detail it will be necessary for you and any co-staff to review carefully the entire design to assure that there is an understanding of the overall sequence of activities and of specific trainer activities/responsibilities for each session. In reviewing the design for each session you should do the following:

1. Review the trainer and participant materials;
2. Review the purpose/goals of each session and determine the relationship of the session to the previous and subsequent sessions, and the total course;
3. Prepare session/exercise goals/objectives on flip chart. Note: Write these in your own words rather than copying them verbatim from the guidelines;
4. Be sure all the materials are prepared, equipment is working, and that the space needed is properly set up for training;
   -Prepare flip charts before the sessions; if an easel is not available, paper may be tacked or taped to the wall;
   -Prepare any lecture notes required - keep these to a minimum - Gather copies of all handouts and worksheets,
5. Review the sequence of activities, the points to be discussed, and materials several times before the session to become thoroughly familair with the session and its content,
6. Assign shared responsibilities of co-trainers,
7. During the presentations, keep in mind the structure of the session, i.e., introduction, major points summary.

If you are not confident of your own knowledge as to the content of one of the sessions, you may want to look for an outside resource to cover that session. We had a soil specialist cover the session on soils and a person actively engaged in agro-forestry cover the session on agro-forestry.

Adding to the Given Design

It has been our experience that outside speakers do not necessarily add to the design. In fact, we had to redo two sessions when speakers did not cover material they were asked to cover. Be sure experts are expert and focus their talks on the required topic area.

Inviting a speaker because they speak Spanish does not always mean his/her Spanish will be understood. Inviting a host country expert is good because the trainees need to hear articulate host country nationals and see the resources available.

Sequence for Session/Exercises

For each session/exercise the trainer should:

- Explain purpose of the session/exercise,
- Review specific goals and objectives,
- Summarize major activities contained in session/exercise,
- Provide time for participants to record in journals.

Remember the time allotted for each activity is approximate. More or less time may be required or desired depending on group size and needs. While some flexibility is "built-in", scheduling should allow for adequate coverage of all activities in each session.

WORDS ABOUT TRANSITIONS

One key to any training program "hanging together" is the participants' understanding of how the pieces (i.e., sessions and exercises) fit together.

It is important to bridge each exercise and/or session with the one(s) that precede and follow it. These transitions are done simply by summarizing what has already happened/been accomplished:

> **Thus far we've had a chance to get to know each other, review the goals of the training program, and reach agreement on what we might expect from this training.............**

Then link it to what is going to happen:

> **In addition to being helpful in "hands on" nursery management, this session will also generate useful data in conducting small research projects.**

Each session/exercise needs to be explained with these linkages in mind. As you prepare to introduce individual activities take a few moments to determine what these transitions are and which ones you need to highlight as you explain the goals of each activity.

Welcome, Expectations, and Evaluation Criteria.

Total Time: 2 hours 45 minutes

Goals (Metas)

- Introduce staff and define staff roles,
- To provide an overview of the training program goals,
- Introduce experiential training method and explain adult learning theory,
- Go over schedule for week,
- To share expectations,
- To provide evaluation criteria,
- To provide an opportunity to become better acquainted.

Overview

The beginning session is critical to establishing the climate for the entire training program and assuring that everyone understands the intended outcomes; the methods of training and the ground rules for the conduct of the workshop. It is also the time for people to get acquainted. Even if they have met before, it is helpful to have participants re-introduce themselves in some way that is relevant to the training program.

Exercises

- Training program overview/goals.
- Who are you?
- Expectations.
- Working together.

Materials

- Flip charts, marker pens, tape
- Handouts: pencils, pens, weekly schedule, training program schedule, loose leaf binders 5 x 7, Index cards, pins, evaluation criteria.

SESSION I

Exercise I Training Program Overview

Total time 30 minutes

Overview

The purpose of this exercise is to introduce the trainers and other staff and to provide a brief review of purpose and goals of the training.

Procedures

Time Activities

1. **Welcome and Getting Acquainted**
   Introduce yourself and welcome participants to the workshop. Introduce everyone responsible for training and provide an opportunity for them to welcome participants.

2. **Training Overview**
   In the description of the training program the following points may
   10 minutes be made: (Show flip chart with the following):
   - The Adult Learning Theory
     - Adults learn through experience,
     - Adults learn when they have *a need to know*,
     - Adults learn when they can *apply* their learning,
     - Adults have a lifetime of experience to draw from.

   Lecture should make the following points:

   A. To the extent possible, trainees will be *experiencing* training. There will be "hands-on" training. There will be very little directive training as the idea is for them to work out solutions and to solve problems through experience.

B. The very fact that trainees are here for this program tells us that they have a need to know.

C. In some cases such as with graduate foresters there will already be knowledge and skill. This training program is designed for them to apply their new learnings.

D. The trainees have a lifetime (short though it may be) of education, technical skills, job related skills, work experience, and social skills that they have brought with them, which will be sharpened and brought into focus in the next five weeks.

E. Finally, as adults we expect them to take responsibility for their own learning. We will provide many opportunities, experiences, simulation, and insights for them, but they must understand that they alone are responsible for what they get out of this program.

F. The skills that we will focus on here are those that will give them technical competence to do their job and interaction skills that will enable them to do their job within the context of this Latin American culture. It is important that they are not only prepared technically, but through cultural awareness are able to do their job well.

3. Training Goals/Schedule

10 minutes

Briefly review the goals of the training program and explain the sequence of the sessions. Training goals and the titles and sequence of sessions should be displayed on a flip chart for this presentation. At this time each trainee should also be handed a previously made up schedule of sessions.

Put on flip chart the following (use your own words):

SESSION 1

Goals (Metas):

1. To enable trainees to recognize their skills and feel competent in the use of these skills.
2. To enable trainees to know how to transfer the technical skills that they have.
3. To identify areas for skill building and to improve those skills.
4. For trainees to understand their role in host country and as a Peace Corps Volunteer.
5. To help trainees identify resources available to them and find resources in their community sites and host country agencies.
6. For trainees to research species of trees and know where to find information to identify species both indigenous and exotic.
7. For trainees to know how to start small research projects, investigation etc., write projects up related to forestry in host country.
8. Trainees will have illustrated competency in establishing a tree nursery. This includes site location, planning, layout, soil preparation, sowing of seed, outplanting and maintenance.
9. Trainees will have illustrated competency in practical forestry techniques in tree planting, thinning, pruning, pacing, measuring trees and stands of trees, grafting and other techniques necessary to forestry.
10. Trainees will be able to analyze communities' social systems, identify problems and help communities seek solutions.
11. Trainees will understand basic theories of forestry extension work.
12. Trainees will have increased usage of the Spanish language.
13. Trainees will have increased interpersonal, team building, and communication skills.
14. Trainees will have a better understanding of global and country specific forestry issues.

Exercise II

Total Time 30 minutes

Objectives:
- To allow participants to get acquainted.
- To get people talking.
- To begin building a sharing atmosphere.

Overview:

This exercise gives participants an opportunity to get to know each other. Even if they have met in training before this activity allows them to see each other in a different way and to begin talking and interacting.

This exercise is the first in which the participants share something about themselves. The design suggested here is therefore fairly simple and does involve some risk-taking.

Procedures:

Time	Activities
Introduction Set-up 10 Minutes	1. Introduce exercise by stating the purpose and asking participants to get an index card and a pin.
20 minutes for mingling	2. After everyone has a card show the following newsprint; **ON YOUR CARD WRITE OR PRINT WHETHER YOU ARE A FORESTER OR A GENERALIST. NEXT LIST ANY SPECIALIST CLASSIFICATION YOU MAY HAVE. NEXT LIST SPECIAL INTEREST YOU HAVE, i.e., PHOTOGRAPHY, MUSICAL INSTRUMENT, ART...AND FINALLY TWO HUMAN INTERACTION SKILLS THAT YOU HAVE i.e., GOOD LISTENER, ABLE TO MIX WELL IN NEW GROUP,.........** When you have completed your card please pin it on and start to mingle with other participants and discuss each others' card. Try and meet with as many people as possible.

Trainers should join group as participants after you have set up the exercise and are sure people are mingling with each other.

Time check

Let the participants know when they have 5 minutes left so they can check to be sure that they have talked with as many people as possible.

Summary
6 minutes

3. Ask individuals to share some of the interesting "things" they have discussed about each other.

Trainer's Note: Listed below are five possible introduction exercises that can be used. You may prefer to use another exercise that will accomplish the same purpose.

1) Dyad-Quartet
Each person meets and gets to know the other; he/she in turn introduces his/her partner to another dyad.

2) Depth Unfolding Process
Because it takes five minutes per person, this exercise should be done in small groups. The leader should disclose first to make trainees more comfortable.

In the first 3 minutes, tell what has brought you to this point in your life. Use one minute to describe your decision to join Peace Corps. Use the last minute to answer questions from others.

3) Structured Introductions
In dyads, small groups, or in large group, participants can tell why they joined Peace Corps, or write a letter to a friend about their decision.

4) Life Map
Each person draws on newsprint with crayons or magic marker a picture of their vision of their Peace Corps service, using stick figures and symbols.

5) Sentence Completion
The trainer presents a series of unfinished sentences, asking each group member in turn to complete the statement.

Example:

- One of the things I anticipate about my Peace Corps service is____________________.
- The thing I will miss about home is_________.

Exercise III - Expectations

Overview

The purpose of this exercise is to provide each participant with an opportunity to identify and classify his/her own goals and interest in this training program. It also provides an opportunity to match participants goals with the content of the training program and to either reassure participants that goals are possible or to state reasons why goals may not be met and perhaps to negotiate any inconsistencies which may exist.

Procedures

Time	Activities
Introduction 5 minutes Put items on flip chart	1. Divide into small groups. Explain the purpose of the exercise. Ask participants to write on newsprint the expectations they have for this training program. Encourage the groups to record as many items as possible in this short time. Expectations may include things they want: o to know o to have given to them o to have happen/not happen o the facilitator to do/be o the other participants to do/be o to be able to do
List Expectations 15 minutes	Encourage group to record as many items as possible in a short time.
Priority 10 minutes	2. Now ask each group to prioritize the top five expectations that they all share. 3. Ask groups to share their expectations with large group.

Reporting
Expectations
20 minutes

Take a few minutes to review the list of expectations.

Comment and eliminate those that the training program cannot hope to address. Those who are not part of the program may be met depending on ingenuity of the facilitator and technical expertise of the forester trainer. Do not leave group with a list of expectations the facilitators or the program cannot meet.

4. Trainer now produces on newsprint, the following list of questions about group dynamics.

discussion
20 minutes

   a. How did your group work together?
   b. Who took leadership?
   c. Did everyone participate?
   d. Did anyone check to see that everyone was included?
   e. Who recorded for the group; how was that decision made?
   f. Who talked a lot, who talked a little, quality?
   g. How did decisions get made (consensus, voting, railroading)?
   h. Did anyone summarize for group?

Wrap-up
10 min

Trainer asks for observations about what things were the most helpful in each group and records them on newsprint - Asks for things that perhaps weren't quite as helpful, and records them on newsprint. Trainer points out that a great deal of our work will be done in groups and that it is important for us to be aware of our own process, how we get work done and thus get the most out of the training program. Further, we will from time to time ask groups to look at their own process.

Trainer's Note: You will want to save the expectation list to go over at a later date. It is best to leave posted if possible.

Exercise IV - Working Together

Total Time: 30 minutes

Objectives

- To present and discuss the administrative, re: time, breaks, housekeeping issues, travel, per diem etc.
- To reach agreement regarding ground rules about attendance, participation.
- To explain evaluation criteria.
- To clarify role of trainee and participants.

Overview

This exercise is focused on reaching agreement on ground rules for how program participants and staff will work together. The evaluation criteria are also discussed and questions answered. It is also an opportunity for trainees to clarify their roles and expectations.

Procedures:

Time	Activities
Introduction	1. Review purpose and objectives of exercise.
Mechanics, Facilities 5 minutes	2. Present and discuss appropriate points regarding the mechanics of program including: o starting times/stopping times, o break/meal times, o procedures re: meals, o facilities, o restrooms, offices, recreation, etc.
Ground rules 6 minutes	3. Give some general rules about the program and sessions: o attendance; no coming and going, arrive on time, o participation; i.e., the more you give, the more you get,

- Listening - allow and encourage each person to speak fully before the next person begins talking,
- Importance of keeping on schedule.

Norms
5 minutes

4. Discuss the group norms which will help the workshop be a success.

   - Need to trust the process and the trainees.

   - Push youself; stretch even though it may be uncomfortable - that is a part of the learning process.

   - avoid being judgemental with other's contribution - remember that you are responsible for your own learnings.

5. Trainer now produces on newsprint the evaluation criteria. Explains that at the end of each week trainees will be interviewed individually and given feedback based on this criteria.

EVALUATION CRITERIA

Productive Competence

- Ability to transfer information and skills to others.

- Maintains energy level necessary to accomplish tasks, solve problems.

- Able to acquire information and skills necessary to establish professional credibility in program need areas.

- Able to speak Spanish at FSI-2 level.

- Able to formulate 3-month work plan.

Social Sensitivity

- Respect and empathy,

- Cultural awareness,

- Interaction skills,

- Ability to adjust.

Emotional Maturity

- Has strong attitude about self in order to deal effectively with new environment,
- Recognize own strengths/weaknesses,
- Able to give and receive feedback,
- Able to modify behavior appropriately,
- Good mix of pessimism and optimism,
- Self confident,
- Self reliant.

Motivation

- Balance between enlightened self interest and altruistic-humanitarian value system.
- Sense of responsibility and accountability to self, PC and host country forestry service,
- Timely and active participation in training activities,
- Takes active role with group work.

Technical Skills

- Able to grasp basic concepts of forestry techniques,
- Able to use tools,
- Show ability to do simple forestry mechanics and to demonstrate these mechanics to others.

Trainer
Expectations
Role
5 minutes

6. Outline any expectations you have as a trainer as well as the roles you wish to assume. Responsibilities may include:

    - Providing structure/instruction,
    - Introduce each activity and assist in its completion,
    - Monitor group energy,
    - Manage how the group works,
    - Probe/push/facilitate the process of "looking within,"

- drink/have fun/generally enjoy the experience.

Summary

7. Summarize the activity by emphasizing that this training program is really directed at helping participants realize that they have many of the skills and information needed to meet the challenge of their role as a Peace Corps Volunteer. We will be adding to that information and introducing new tools for them to use in forestry. They will develop a new awareness of the cross-cultural dimensions of their volunteer experience and develop skills necessary to communicate, analyze and work with groups in the host country.

TECHNCIAL TRAINING IN FORESTRY - Peace Corps/Ecuador and Paraguay
DAILY SCHEDULE FOR TECHNICAL TRAINING I

MONDAY THROUGH FRIDAY

7:00	Breakfast
7:30 - 11:30	Technical training
11:30 - 12:30	Free time
12:30 - 1:15	Lunch (only Spanish spoken)
1:30 - 3:00	Spanish classes
3:00 - 3:30	Break
3:30 - 5:30	Continuation of technical training Track I Foresters Track II Generalists
5:30 - 7:30	Free time and supper
7:30 - 9:30	Interaction skills; forestry extension techniques; communication (verbal & non-verbal); working with group.
9:30	Journal Writing

SATURDAY

Morning schedule - same as Monday through Friday

1:30 - 3:30	Spanish classes
3:30 - 5:30	Individual interviews with staff
5:30 - 7:30	Free time and Supper
7:30	Joke and story time (in Spanish)

SUNDAY

Morning Free	
Afternoon	Participation in local cultural events on an optional basis.

SESSION II

Special Projects

Total Time: 1 hour 45 minutes

Goals

- To begin the process of transferring skills and experience to others.
- To assume responsibility for teaching others.
- To assume responsibility for completing task assignments.
- To produce a manual for use in field to which all participants have contributed.
- To have participants become familar with resource library.

Overview

The purpose of this exercise is to begin to identify those participants with special skills and have them assume responsibility for transferring those skills during the training program. To give all participants special assignments which they will have to complete during the first three weeks of training. To discuss materials which have been collected and made available for their use in the resource library.

Exercises

- Introduction of individual projects which all participants are expected to do.
- Introduction of group project.
- Introduction of forester project.

Materials

flip charts, marker pens, tape,
special projects schedule of due dates
*board 1 meter long X 1 meter wide
graph paper
common pins
rubber bands
board 4 cm (H) X 3 cm (W) X 2 cm (L)
pole 2 cm long (bamboo is good)
small piece of wood 2 cm (H) X 4 cm (W) X 40 cm (L)
nails
wing nut 6 cm long

*protractors
plumb line
weight
survey flags
stakes
*measuring tapes
(3 meters long)

*One for each volunteer

Exercise I- Individual Projects

Overview

The purpose of this exercise is to have each participant identify, research and write up a different species of tree. Based on their site visits they will prepare an agro forestry plan for their sites.

In groups, have participants prepare a presentaton on the ecology of their geographical area to present to a class.

In groups, have participants select forestry and research issues and write an extensive paper on the issue.

Have individual foresters take on projects which are integrated into this program design.

Procedures:

Time	Activities
Introduction 5 minutes	1. Introduce exercise stating the purpose. Explain that participants will be writing their own forestry manual and the purpose of this exercise is to get the content organized.
Species	
10 minutes	2. On newsprint introduce the following outline for species section:

SPECIES
(ESPECIES)

SCIENTIFIC NAME
(NOMBRE CIENTIFICO)

COMMON NAME
(NOMBRE VULGAR)

FLOWER: TYPE, FLOWERING CYCLE SKETCH
(FLORA)

FRUIT: TYPE, COLOR
(FRUTA)

SEED: GERMINATION, WHEN SEED MATURES, HOW TO COLLECT, METHOD OF STORAGE, TREATMENT, SKETCH
(SEMILLA)

LEAVES: TYPE, ALTERNATE - OPPOSITE, MARGINS, SHAPE, COLOR
(HOJAS)

BARK: GENERAL CHARACTERISTICS
(CORTEZA)

SHAPE: YOUNG TREE, MATURE TREE
(FORMA)

HABITAT: WHERE TREE GROWS, SOIL, WATER
(HABITAT)

USE: LOCAL, INDUSTRIAL, COMMERCIAL
(USO)

RANGE: N-S-E-W
(EXTENSIÓN)

DISEASE -INSECTS: TYPES, CONTROLS
(ENFERMEDADES - INSECTOS)

NURSERY MANAGEMENT NEEDS: HOW TO TREAT IN NURSERY
(MANEJO EN EL VIVERO)

MAIN IDENTIFICATION CHARATERISTICS
(CARACTERISTICAS PRINCIPALES DE IDENTIFICACIÓN)

1.
2.
3.
4.

REFERENCES
(REFERENCIAS)

NURSERY REQUIREMENTS:
NATURAL REGENERATION:

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Have sample species written up on newsprint along with sign-up sheet. Note: No duplications; each participant must take at least one specific/different species to write up.

They have until the following day to select species and sign up.

3. Agro forestry site plan. The trainer should explain that this is a new sub-discipline of forestry - about 10 years old - although it has been practiced by farmers to some degree over many years. Since it is a new discipline, there is very little written on agro forestry and nothing which is site specific. Trainer should point out that it is quite possible that this generation of participants are the ones who will write the books and become the authorities. However, based on their own observations and knowledge, we want them to work up a plan for their site area. It should be as extensive as possible.

Ecology
teams
15 minutes

4. Ask participants to form groups based on geographical similarities of their sites. They are to select a group leader who will be responsible for calling meetings and managing their presentation. Trainer should state the purpose of ecology report. It is to make up a presentation about the ecology of their geographical area which they will be able to present in a school or to a group at their future site. Group leaders are responsible for giving the trainer a list of persons working in their group.

Group
process
10 minutes

Trainer now asks group to take a look at their own process using newsprint from Session I, Exercise III Section 4.

Introduction
5 minutes

5. Trainer now discusses forestry issues, stating that these are issues which are of concern to all those working in forestry. Since they are issues they will require a great deal of research and discussion as well as decisions about paper write-up.

Topics for Forestry Issues

1. Industry and Jobs vs. conservation.
2. Need vs. conservation (rural dependence).
3. Exotic vs. indigenous species.
4. Forest Management (an overview).
5. Forestry Law, its effectiveness and enforcement.
6. Forest products, other than timber.
7. Cost analysis of development projects, what needs to be considered, possible sources of revenues.
8. Cooperatives, local credit schemes and other incentives.
9. Elements to be considered in project area surveys - are they necessary?

Trainer's Note: The above are some of the issues chosen but are not all the forestry issues. You may want to add or delete from the above list. The important thing here is to have enough issues so that at least each pair of trainees can get a different issue to write on.

5 minutes — Trainees now walk around and look at issues.

5 minutes — Trainer now asks trainees to select issue they would like to work on. At least two trainees per issue, not more than four per group.

10 minutes — After groups have been established they select a group leader who is responsible for calling meetings and managing their presentations.

10 minutes — 6. Forester projects - trainer now introduces a list of projects which individual foresters are asked to volunteer to do; it is explained that these projects are part of the design and have specific details which the forester trainer will be able to explain in detail. Foresters are asked to volunteer for projects. Projects and due dates are listed on newsprint. Foresters can over the next day select a project to work on.

a. Making a diameter tape - this project involves forester participant assembling the materials (which are available) and figuring out the best way for each trainee to make their own diameter tape. Forester trainee then demonstrates the use of a diameter tape and has other trainees practice using diameter tape.

b. Making a Biltmore Stick - forester trainee assembles the materials (which are available) and figures out the best way for each trainee to make their own Biltmore Stick. Forester trainee then demonstrates the use of Biltmore Stick and has other trainees practice using the Biltmore Stick.

c. Rustic transit - forester trainee assembles the materials (which are available) and assembles a rustic transit. Shows other trainees how to use rustic transit and writes up directions for building one.

d. Plane table survey method - Forester trainee assembles the materials (which are available) and makes a plane table. Shows other trainees the plane table survey method. Writes up directions for building a plane table.

e. Forester trainee writes up directions for building a greenhouse using materials locally available. Describes this building process to other trainees.

f. Forester trainee prepares a slide show on a forestry related topic. This slide presentation is to be used later by Peace Corps in host country. If slides are not available, forester trainee writes directions for preparing a slide presentation.

g. Compost heap - at the onset of training forester trainee prepares a compost heap near nursery site. Explains steps to other trainees, keeps graph of temperature and the time that compost is turned. Compost will be available for use during last week of training if done correctly.

7. Special management of projects for which any participant can volunteer.

Management projects can be selected over the next few days.

a. Prepare lecture on how to prepare lesson plans. Write up directions. Give lecture to group. Have each trainee prepare simple lesson plan and demonstrate to group.

b. Manage trainee manual, keep track of contents, get ready for publication.

c. Manage species report - find creative way to introduce reports to group. Give lecture on species identification.

d. Manage and facilitate Forestry Issue Presentation, find responders to each presenter. Keep discussion going.

e. Plan tree planting area, assemble needed tools, help other trainees execute planting plan.

f. Plan soil erosion walking tour. Find gully for plugging, demonstrate gully plug technique.

g. Plan presentation on watershed management. Present to other trainees.

h. Manage and facilitate ecology presentation. Find interesting way for group to critique ecology.

i. Select volunteer to collect the daily temperature, weather conditions, winds and humidity and post this information daily.

j. Insect collection and identification. Trainee prepares lecture and gives demonstration.

Trainer's Note: A sample of some of the special projects can be found at the end of this section. You may want to delete some projects and add others that are more specific to host country. However, since these projects are built into design they will have to be covered by trainers if not done by trainee.

8. Summary by trainers should state that we are aware that actual training has not yet begun but you can already see that we are going to have a very busy time.

We are sure that no one will be bored.

9. Trainers are now invited to go to the resource material room to browse around and acquaint themselves with materials available. They are told that the process for taking out a book is to pull the book slip, sign one's name and put slip in box provided for same.

Trainer's Note: Within the next few days people will start complaining that others are hanging on to materials they need. At this point trainer should offer sympathy and suggest that complainer needs to take up issue with group.

The Forest of the World, Peace Corps Forestry Goals, the Individual Volunteers' Roles

Total Time: 2½ hours.

Goals

- To provide a global view of forestry today and in the future.
- To provide information on Peace Corps forestry goals.
- To bring the individual volunteer's role into perspective.
- To have participants brainstorm key problems and possible solutions concerning forestry, reforestation, aforestation in and around their sites.

Overview

This session is to bring into focus the global view of the world's disappearing forest. Discussion then moves to Peace Corps goals in forestry and finally brings into perspective the role of the individual volunteer. It also allows trainees to search for possible problems and propose solutions based on their observations at their future sites.

Exercises

1. Participants brainstorming of problems and solutions.
2. Lecture on global views, Peace Corps goals, individual perspective.

Materials:

Flip charts, marker pens, tape.

Exercise I: Problems and solutions in forestry at the volunteer trainees's work sites

Total Time: 1 hour.

Overview

The purpose of this exercise is to have participants brainstorm and record problems and solutions in forestry at their work sites.

Procedures:

Time	Activities
	1. Trainer asks for groups to form based on geographical site locations; i.e., those with similar climate, species, etc. Trainer then asks groups to spend a minute brainstorming problems that they observed while on their site visits and list them on newsprint. Next after problems have been listed, list possible solutions.
45 minutes	
	2. Small geographical groups present their lists of problems and solutions to large groups.
	3. Trainer then summarizes the activity and points out similarities and differences.

Trainer's Note: These lists should also be saved as they will be used again as a part of a later exercise. It is best to keep them posted if possible.

Exercise II Overview of Forestry from a Global Perspective, the Peace Corps Goals, and the Individual Volunteers Role

Total Time: 1 hour, 10 minutes

Overview

The purpose of this exercise is to give information on the world problems in forestry. To state the Peace Corps goals and to give hope to the individual volunteer that they can play a part in changing the grim prediction for the world's forests.

Procedures

Time	Activities
	1. Trainer, or if possible visiting authority on forestry, gives lecture on global picture. Lecture outline follows.

GLOBAL DEFORESTATION

I. Causes of Deforestation

A. Clearing for Agriculture

(1) Shifting agriculture
(2) Colonization
(3) Unemployment
(4) Land tenure
(5) Cattle raising

B. Firewood Gathering

(1) 4/5 of volume removed from tropical forests is for firewood.
(2) Charcoal Production

C. Logging

(1) Clearcutting
(2) Damage to standing timber left 55% of stand
(3) Little reforestation

II. Success of reforestation will include:

A. Technical proficiency
B. Personal fulfillment
C. Agency accomplishment
D. Community involvement

III. Selection of areas of action out of awareness of total picture.

A. Results of Deforestation

(1) Erosion
(2) Loss of raw material
(3) Siltation - River; dam
(4) Soil infertility
(5) Economic loss
(6) Extinction of flora and fauna
(7) Lack and/or reduction of water
(8) Lack of toilet paper

2. Trainer or if possible Program Manager from Peace Corps gives lecture on Peace Corps goals for forestry.

Lecture outline

20 minutes

A. Ideal: Educate people to:

1) Conservation
2) Rational utilization of resources

B. Practical: Plant as many trees as possible.

C. What to do:

1. Agency Problems

   a. Political
   b. Emphasis on technical
   c. Lack of interest
   d. Efforts do not address problems
   e. Lack of resources
   f. Laws
   g. No cooperation with other agencies; no cooperation among field of specialization

2. Campesino/community Problems

   a. Have other problems to solve
   b. Getting people together is difficult
   c. Level of education is usually low
   d. Cultural habits difficult to work with

20 minutes **3. Trainer gives the lecture on what the individual can do. Outline follows.**

D. The Answer?

1. Forestry Measures

   a. Agroforestry systems
   b. Village woodlots
   c. Intensive plantations
   d. Better management - Reserves
   e. Regulating logging practices
   f. Application of known technology
   g. Research

2. Enabling Actions

   a. National development patterns
   b. Alternatives -food supply
   c. Increase crop yields
   d. Land tenure
   e. Effective attention energy
   f. Conservation of forest products
   g. Better stoves - recycling
   h. Reduce waste
   i. Population

Trainer's Note: In the back of this section are sample lectures. You will want to put these views in your own words. However, depending on resource people available at the time of training you may not need to worry about lecture preparation.

15 minutes	4. Trainers and/or speakers ask for questions from participants. Trainer summarizes - pointing out that volunteers are a part of a large picture and have a valuable job to do and that we are going to spend the next 5 weeks getting ready to do that job.
15 minutes	5. At this time the director of conference/training center may want to say a few words of welcome and give tour of training facilities.

Language Class

Total Time: 1½ hours

Goals:

- To provide trainees with language classes to hold language capabilities at entry level or if possible, increase language proficiency.
- To integrate technical language as part of language training.

Overview:

In this first language class, it is important for teachers to set the ground rules for class. Basically classes are to be conversational, but grammar will also be stressed. Proper pronunciation of words will also be stressed.

Procedure	Activities
Time: 1½ hours	1. Teachers will be given the activities of each session. They will discuss in Spanish the activities of preceeding sessions. 2. Teachers will go over vocabulary list for each day helping participants with pronunciation and putting vocabulary words into sentences using correct grammar.

Vocabulary list

Afforestation - repoblación forestal; aforestación
Tree class - classe de árbol
Ecology - ecología
Flower - flor
Forest - mante, bosque
Forestry - técnica forestal, dasonomia
Fruit - fruta, fruto
Leaf - hoja
Nut - nuez
Reforestation - reforestación
Root - raiz
Seed - semillia
Site - sitio
Tree stem - tronco, tallo
Tree - árbol
Wood - madera

SESSION IV

Feedback and Journal Writing

Total Time: 1 hour 45 minutes

Goals:

- To review how to give and receive feedback;
- To learn more about ourselves;
- To become more skillful in obtaining and understanding information about the effectiveness of our behavior;
- To become more sensitive to our reactions to others and the consequences of these reactions;
- Participants will understand the importance of keeping a journal.

Materials:

- flip charts, marker pens, tape, note books with tabs for journals.

Exercise I — Feedback

Total Time: 1 hour

Overview

The purpose of this exercise is to remind participants that although they may have had lectures and some practice in feedback, that giving timely, skillful feedback needs to be practiced.

Procedures

Time	Activities
5 minutes	1. Trainer should acknowledge that everyone of the trainees has been through feedback practice at the CAST, CREST, or Staging and that many may have had an introduction to feedback even earlier.
5 minutes	2. Ask individuals to jot down as many feedback rules as they can remember off the top of their heads.
15 minutes	3. Trainer now produces newsprint with the following rules;

FEEDBACK RULES

1. It is honest and frank rather than diplomatic or subtle. It is true reporting of your real feelings and reactions to the behavior of another person. This implies that you are aware of your reactions and are willing to run the risk of possible rejection by sharing them with the other person.

2. It is specific rather than general. To be told that one is dominating will probably be as useful as to be told that: "Just now you were not listening to what the others said, but I felt I had to agree with your arguments or face attack from you."

3. It is focused on behavior rather than on the person. It is important that we refer to what a person does rather than to what we think or imagine he is. Thus we might say that a person "talked more than anyone else in this meeting" rather than that he is a "loudmouth". The former allows for the possibility of change; the latter implies a fixed personality trait.

4. It takes into account the needs of the receiver of feedback. Feedback can be destructive when it serves only our own needs and fails to consider the needs of the person on the receiving end. It should be given to help, not hurt. We too often give feedback because it makes us feel better or gives us a psychological advantage.

5. It is directed toward behavior which the receiver can do something about. Frustration is only increased when a person is reminded of some shortcomings over which he has no control or a physical characteristic which he can do nothing about.

6. It is solicited, rather than imposed. Feedback is most useful when the receiver himself has formulated the kind of question which one can answer either by observing him or through actively seeking (soliciting) feedback.

7. It involves sharing of information rather than giving advice. By sharing information, we leave a person free to decide for himself, in accordance with his own goals, needs, etc. When we give advice we tell him what to do, and to some degree take away his freedom to decide for himself.

8. It is well-timed. In general, immediate feedback is most useful (depending of course, on the person's readiness to hear it, support available from others, etc.). The reception and use of feedback involves many possible emotional reactions. Excellent feedback presented at an inappropriate time may do more harm than good.

9. It involves the amount of information that receiver can use rather than the amount we would like to give. To overload a person with feedback is to reduce the possibility that he may be able to use what he receives effectively. When we give more than can be used, we are more often than not satisfying some need of our own rather than helping the other person.

10. It concerns what is said or done, or how, not why. The "why" takes us from the observable to the inferred and involves assumptions regarding motive or intent. Telling a person what his motivations or intentions are more often than not tends to alienate the person, and contributes to a climate of resentment, suspicion, and distrust; it does not contribute to learning or development. It is dangerous to assume that we know why a person says or does something, or what he "really" means, or what he is "really" trying to accomplish. If we are uncertain of his motives or intent, this uncertainty in itself is feedback however, and should be revealed.

11. It is checked to insure clear communication. One way of doing this is to have the receiver try to rephrase the feedback he has received to see if it corresponds to what the sender had in mind. No matter what the intent, feedback is often threatening and thus subject to considerable distortion or misinterpretation.

Trainer asks how many of you remember all eleven rules?

4. Trainer now gives the following reasons why we want to practice and become more skillful at giving and receiving feedback.

   a. By learning to give and receive feedback skillfully, we help ourselves and others become more effective as volunteers.

   b. The more we learn about ourselves in this training and about how effective our behavior is, the more we will be prepared for our two years as an effective volunteer.

   c. We will also become more sensitive to our reactions to others and the consequences of these reactions in our interpersonal relationships.

15 minutes — 5. Trainer now asks group to break into groups of five and brainstorm ways in which we can become more skillful at giving and receiveing feedback and list ideas on newsprint.

5 minutes — 6. Trainer now asks groups to present their list to entire group.

7. By way of summarizing, two trainer models for giving and receiving feedback through short role plays are used.

The feedback should be real, perhaps based on the record keeping exercise that they took part in. This would help set a climate of openness. It is also important to model positive feedback.

SESSION V

Record Keeping - More Group Process

Total Time - 2 hours 15 minutes

Goals:

- To establish the importance of record keeping, as scientists and as responsible Peace Corps Volunteers.
- To observe group process.

Overview

This exercise is devoted to the importance of accurate record keeping not only during training but also as a professional habit during Peace Corps service. The groups will also look at its own group process.

Exercise:

I. Record Keeping
II. Group Process

Materials

Flip charts, maker pens, tape.

SESSION V

Exercise I: Record Keeping

Total Time: - 1½ hours

Overview

The purpose of this exercise is to provide trainees with an opportunity to realize the importance of record keeping as a must during training, and also during Peace Corps service.

Procedure

Time	Activities
	1. Trainer divides participants in groups of five, asking that people get together with others with whom they have not worked.
Data Collection 20 minutes	2. Trainer gives the group the following problem posted on newsprint: What information would you need to know if you arrrived three weeks after an experiment in germination was set-up in a nursery and you are expected to take over the experiment? Trainer asks groups to make a list of all data they would need.
10 minutes	3. Have two groups meet together and combine their lists.
10 minutes	4. Combined groups present to large group their combined data sheets.

Trainer's Note: The purpose of combining groups (making then large) is to have groups experience what it will be like in the field, having people with the same information, but articulating it in a different way.

Time	Activities
30 minutes	5. The combined groups are now given the task of designing a record keeping form. They must figure out how they can best do the task with such a large group. The form developed is put on newsprint.
10 minutes	6. Groups make presentations and critique each others forms.

7. Trainer summerizes as follows using newsprint:

10 minutes Data Sheet

a. careful layout
b. easy to read
c. easy to use
d. all on one sheet if possible
e. all data can be important

8. Trainer stresses once again the importance of keeping records during training.

9. Move from this exercise directly into the "Group Process" exercise.

Exercise II - Group Process

Total Time - 45 minutes

Goals:

- To explore the group process.
- To understand collaboration.

Overview

In this exercise experiential learnings and group collaboration are emphasized.

Procedure:

Time

Activities

1. Each group is instructed to discuss observations of the group process, both on a technical and interpersonal level. Some questions that may stimulate discussion are:

   a. What were the reactions of group members regarding various individual technical skill levels in the group?

   b. Did people find it a help or a hinderance to work with people of different skill levels?

   c. How were decisions made during the data/form making process?

   d. What factors contributed to or impeded mutually shared decision-making?

2. Trainer presents a summary of various styles in group decision-making, including:

   - the "pulp"
   - self authorization
   - handclasp
   - baiting
   - authority rule
   - majority vote
   - unanimous consent
   - consensus

A short discussion follows concerning the potentially positive (satisfying) or negative (frustrating) consequences of each type of decision-making technique. Trainer should point out that all the styles, with the exception of consensus, often preclude the full involvement and commitment of some group members, or ignore important issues that should be raised. Mutually-shared decision-making, termed consensus, is a positive alternative to other styles; although it may require more time and increased sensitivity to the individual group member, it provides for the involvement and commitment necessary for group cohesiveness and cooperation.

10 minutes

3. Each group meets to discuss the styles of decision-making that characterized their group during the record keeping exercise.

4. Trainer guides a summary of group conclusions concerning decision-making styles and group cooperation. Some points for discussion are:

    a. The perceived value of different styles to facilitate accomplishing a group task,

    b. The reaction of group members to various styles,

    c. Observations of ways to improve group dynamics during training,

    d. The application of such experience to the role of the volunteer in forestry extension work.

Exercise II

Journal Keeping and Setting

Total Time - 45 minutes

Overview:

This exercise reflects back to Session V and record keeping. As scientists, it is important for participants to collect data daily and keep a journal as part of their profession. Further, it is a key to recording information and provides a tool for trainees to use once they have left the security of the training program. The journal can be used for project management and continued learning, as well as goal setting, planning and personal reflection.

Procedure

Time	Activities
2 minutes	1. Introduce the purpose of the session.
10 minutes	2. Explain to the group (with the use of a flip chart) the following format for journal use. (Provide notebooks with tabs). Divide the journal into the following sections: a. Weekly goals (for learning during training, then for tasks during volunteer service), b. Daily activity log, c. Community analysis questions and data, d. Community problem analysis, e. Personal reflections, personal learnings, f. Scientific, climatic data, g. Language words I hear and want to look up.
30 minutes	3. Ask the group to begin making their first journal entries by writing their personal learning goals for the week. Under each goal, try to write as many objectives as possible. Relate this back to the "responsibility for one's own learning."

4. Explain that there will be quiet time every evening for a half hour of journal writing.

Flowers, Seeds, the Beginning

Total Time:

Goals:

- To refresh the memories of the trainees about flowering cycles, pollination, seeds, seed germination, seed dispersal, basic seed storage and point out the lack of knowledge we have about seed germination and dispersal among many tropical species. To instruct the trainees in basic seed storage .
- Enable trainees to set up seed collection records.
- Conduct seed germination experiments.
- Look at small group process.

Overview

This session is a review of the flowering cycle and seeds from pollination to germination. It is necessary to start at the beginning here as most trainees will have studied these cycles in North America and need to see the differences, particularly in tropical species. The trainees will also have "hands-on" experience in treating seeds (stratification and scarification) and setting up a simple experiment and keeping records.

Exercises:

1. Lecture on flowers & seeds
2. Germination experiment
3. Small group process

Materials

- flip charts, marker pens, tape
- 20 different varieties of seeds about 300 or 400 in all
- small plastic bags
- blotter paper or newspaper

Exercise I Flowers & Seeds

Total time - 1 hour

Overview

Many of the participants will have learned in North American schools the cycles of flowering and seed development. However, the purpose of this lecture is to refresh their memories and have them relate the cycles to the Latin American forests and trees.

Procedures

Time	Activities
1 hour	1. Trainer/forester states that this morning is a quick refresher for everyone and invites a botanist in the group to join in and add his/her comments throughout the lecture. It is recommended that the following outline be put on newsprint and trainees follow it as lecture is given.

FLOWERS

1. Many different types.

2. Complete flowers - bisexual.

3. Staminate (male) flowers and pistillate (female) flowers on same tree, monaecius (pines; Douglas-fir).

4. Staminate and pistillate flowers occurring on separate trees (willow; poplar).

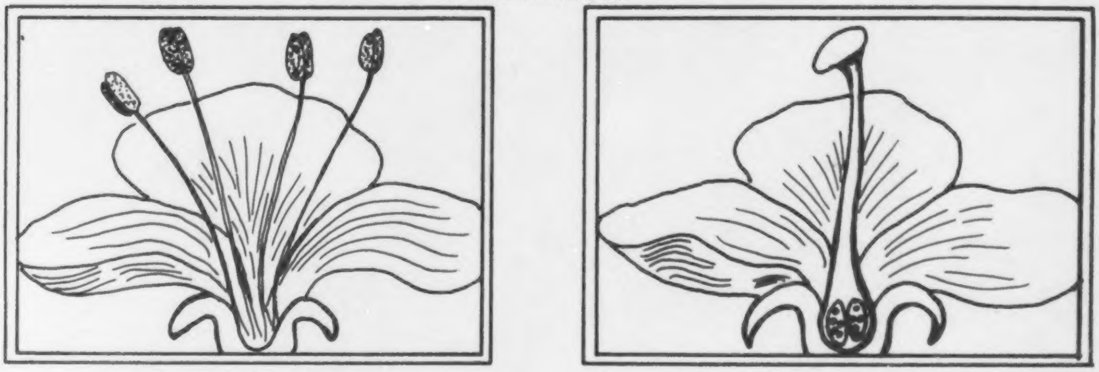
5. Polygamo - monoecius - complete flower plus staminate and pistillate flowers on same tree (Buckeye).

6. Polygamo - Dioecious - perfect flowers plus either staminate or pistillate flowers (Buckthorn).

Note: All of the above type trees can bear seeds except the dioecious tree that produces staminate flowers.

FLOWERING CYCLE/SEED MATURITY

POLLINATION



Staminate Flower (Fig. 1) Pistillate Flower

Pollinators
  a. Wind
  b. Insects
  c. Birds
  d. Others- mice, bats

Two nuclei penetrate the ovule and double fertilization occurs.

1. One fertilization unites to egg forms embryo.

2. Other fertilization unites with two polar nuclei to form endosperm.

SEED

I. Mature Seed

- A. Three - six months after fertilization
- B. 1 year after fertilization - Pine
- C. Some take more time

II. Formation

- A. Mature embryo embedded in endosperm (endosperm can be small or absent).
- B. Seed coat (integument) forms around the ovule.

III. Embryo = Germ

- A. Composed of:
  - 1. Seed leaves - Cotyledon - mostly two (palms 1, pines 4+)
    - a) manufacture food or
    - b) have stored food
  - 2. Bud - Plumule
  - 3. Stem - Hypocatyl
  - 4. Rudimentary root - radicle
  - 5. Seed Coats
    - a. hard (Pines)
    - b. soft
    - c. leathery (Cypress)

IV. Types of Seed
- A. True seeds (from Pine)
- B. Dry fruits; fruit is seed (oak)
- C. Fleshy fruit (apple)

V. Ripening

- A. Chemical change
- B. Hardening
- C. Dry
- D. Color change

VI. Seed Dispersal

- A. Wind
  - 1. light seeds
  - 2. Seeds w/wings
- B. Mammals - Birds
  - 1. Rodents
  - 2. Animals

- C. Water
- D. Fish
- E. Man

VII. Seed Collection - Records

- A. Seed Maturity
- B. Ripeness
- C. When to collect
  1. early collection - not ripe
  2. late collection - few viable seeds left

- D. Methods
  1. climbing
  2. clippers
  3. cutters
  4. shaking
  5. logging
  6. bamboo poles
  7. collect off ground
  8. spread sheet below tree

- E. Seed Extraction
  1. air dry*
  2. oven kiln
  3. depulping
  4. dewinging
  5. floating
  6. winnowing

*Note: Important in air drying that birds do not eat seeds. Air drying is also the most used and practical method.

- F. Seed Treatment
  1. burning
  2. soaking
  3. boiling
  4. filing - soaking
  5. cutting - soaking
  6. tumbling - (with grit)
  7. others

Internal dormancy (triggering internal chemical reactions)
External dormancy (seed coat permeability)

- G. Germination

  To Take Place

  1. internal factor - ripe
  2. external factor
     - a. moisture
     - b. temperature
  3. dormancy
  4. oxygen
  5. light

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H. Seed Storage

1. dry - cold: In sealed containers:
   Pine (pino), Cypress (Ciprés)

2. moist cold:
   Oak (roble), Maple (arce)

10 3. room temperature:
   Acacia (acacia), Eucalyptus (eucalipto)

minutes 4. other possibilities
   a. partial vacuum
   b. dry freeze
   c. hole in the ground - bury in sealed plastic bags.

5. how does nature do it?
   peat moss (turba)

6. small containers

SESSION VII

Exercise II Germination Experiment

Total Time: 2 hours

Overview

The purpose of this exercise is to give trainees "hands-on" experience and to apply learnings from previous exercise. Trainees will also develop a record keeping system for their experiments which will reinforce learning from record keeping exercise of the previous day.

Procedures

Time	Activities
	1. Trainees are asked to form groups of three. Groups are given a variety of seeds.
	2. Groups are told that they are to figure out the best way to treat the seeds (scarify and/or stratify). They must decide three different methods with at least two varieties of seeds. They are told the species.

Trainer's Note: The purpose of this exercise is not to furnish all the materials trainees need, but to have them find their own boiling water, sand paper, finger nail files etc., at the training site. Plastic bags, seeds and blotter paper are provided.

Time	Activities
45 minutes	3. Trainees are told to figure out a record keeping system for the germination experiment.
15 minutes	4. Trainee/manager is identified; the groups are to report their data on progress of germination experiments to manager every three days.

Trainer's Note: Trainer or expert in seed management should present the most applicable procedures and record keeping system used for germination text. Obtain feedback on students' efforts.

Exercise III Small Group Process

Total Time: 45 minutes

Overview

The purpose of this exercise is to look at small group process as compared to larger group process of the previous day. We also make use of feedback skills.

Procedures

Time	Activities
	1. Trainers look at the process of their groups. They are told to give each other feedback on the following:
30 minutes	a. leadership qualities b. participation c. what helped/hindered getting task done. Everyone must get/give feedback. While one is giving feedback to another, the third trainee observes the quality of the feedback and gives feedback on the quality and skill used for giving/receiving feedback.
5 minutes	2. Trainees are asked to compare working in a small group to working in a larger group.
5 minutes	3. Trainer lists on newsprint findings of various groups as to: o things that are harder, o things that are easier, o impact on individuals.
2 minutes	4. Trainer points out the greater responsibility of human interactions as trainees work together and become more skillful.

SESSION VIII

Spanish Language Class

Total time: 1½ hours

Overview

same as session four

Procedures

Time	Activities
1½ hours	1. Conversation 2. Grammar 3. Sentence construction

Vocabulary

Interpersonal - entre personas
Interrupt - interrumpir
Communication - comunicación
Skill - habilidad, maestria
Behavior - comportamiento, conducta
Positive - positivo
Power - poder, potestad, autoridad, influencia
Rude - rudo, crudo, tosco, primitivo
Polite - cortes, atento, culto, fino

SESSION IX

Non-verbal Communication

Total Time:

Goals:

- To identify ways we communicate verbally and non-verbally.
- To identify patterns of non-verbal communication.
- To look at perceptions one has about one's non-verbal message.
- To identify some implications of non-verbal communication for cross cultural effectiveness.
- To develop non-verbal communication skills.

Overview

This session explores communication as a process. Trainees will have received some non-verbal communications training previously. This session will reinforce those learnings and concentrate on building non-verbal skills.

Exercise:

1. "Messages" and lecture
2. Reflections on non-verbal communications and observations of another.

Exercise I Messages

Total Time: 45 minutes

Overview

We communicate our likes and dislikes; actually we communicate more non-verbally about relationships than we do in any other way. In this exercise we are going to communicate non-verbally only.

Procedures

Time	Activities
5 minutes	1. Trainer announces that "we are going to try a game; the meaning of which we will discover later, trust me." The game is structured rather like charades except that one may not use charade-like signals (such as spelling with the fingers or using work conventions. Even if you have played this game before, it is fun to see if you are becoming skillful at it.
	2. In pairs, give each person a message on a piece of paper (see list below); then tell the group that they have three minutes to try to get the message across without using words. They cannot write, spell or talk. Trainer keeps track of time. After first three minutes, switch so that the other person can try it out also. A sample list of messages follows (you may add your own but the message should include either an emotion or communicate something about a relationship, as well as to try to give a message about a thing). Messages (have them written out on slips of paper): a. "I'm angry because the goats ate my seedlings." b. "I'm happy because your crew arrived to work today." c. "I'm frustrated because you never listen to me."

d." You can't understand me, and this frightens me."

e. "I'm surprised at your youthful appearance."

f. "I like you and want to be your friend."

g. "I'm weak (and submissive) and you are strong (and dominant)."

h. "I don't like not being able to talk."

3. After the non-verbal experience, gather group reactions:

   - o What was that like for you?
   - o What was easy about it (i.e., what part of the message could you get)?
   - o What was difficult (i.e., what part of the message couldn't you get)?

4. Build a lecture out of group experience:

   - o How many of you know about non-verbal communication?

   - o What is it? Give some examples.

30 minutes

   - o What does non-verbal communication communicate?

   - o How aware are you of your own non-verbal message?

   As trainees answer these questions, write down the answers on a flip chart and examine them with the group. At the end, the group and the trainer should arrive at a working definition of non-verbal communication which they can test out during the next week with each other.

Exercise III

Reflections on Non-Verbal Communications and Observations of Another

Total Time: 45 minutes

Overview

The purpose of this exercise is to give individuals time to think about how they communicate non-verbally. They can then decide if there is perhaps some new or different non-verbal behavior they would like to try out during training.

Procedure

Time — Activities

1. Trainer lists on newsprint the following:

   - o Body bearing
   - o Appearance
   - o Tone of voice
   - o Use of space
   - o Content of language
   - o Gestures
   - o Ornaments
   - o Touching — 20 minutes
   - o Facial expressions
   - o Smells
   - o Colors
   - o Signs
   - o Other

   Asks participants to take a few minutes to write down how and what they think they communiate non-verbally in each one of these categories.

2. Ask participants to look over responses to the non-verbal categories. Determine it there is some area of non-verbal communication they want to strengthen or perhaps change. — 5 minutes

3. Ask participants to choose partners which will be for the purpose of "observing each other" for a one week period in order to learn more about non-verbal communication and the way we are perceived by another. The task is to "watch each other" during the week whenever possible and notice how the other person uses non-verbal communication.

At this point they may want to share with each other their responses to the non-verbal categories to have partners check-out their perceptions of how and what they communicate non-verbally.

4. Trainer says that at the end of the week, the same pairs will meet to both provide each other feedback on how they communicated non-verbally and to draw some generalizations from the experience about how people from our culture communicate non-verbally. Also, participants will be able to check their own non-verbal images with their partners.

SESSION X

Basic Site Selection, Planning and Layout of a Nursery

Total Time: 4 hours

Goals:

- To introduce nursery teams and explain how and why they were chosen.
- Explore knowledge within group about nursery site selection.
- Group experience in planning and layout of nursery.
- Explore group process in an unstructured situation.

Overview

In this session trainees will be asked to plan a nursery. They will be divided into teams which have been chosen by trainers and given the task without further instructions. It is during this session that the trainees' ingenuity and ability to organize is pushed.

Exercise:

1. Factors to be considered in nursery sites and summary lecture.
2. Location of site and planning of nursery.

Materials

- Flip charts, marker pens, tape.

Nursery Site Selection

(Selección del Sitio para el Vivero)

Points to consider:

1. Moderate slope
   (pendiente moderado)
    - a. drainage (drenaje)
    - b. watering (reigo)
2. Good soil (buen suelo)
   A soil sample should be taken
3. Frost-free site
   (sitio sin peligro de escarchas)
4. Protected from winds
   (protección contra el viento)
5. No large trees near
   (sin arboles grandes muy cerca)
6. Near water
   (cerca de agua)
7. Good labor supply
   (disponiblidad de mano de obra)
8. Transpotation close by
   (cerca de transportación)
9. Permission of owner - written
   (permiso por escrito)
10. Caretaker
    (cuidador)
11. Fencing
    (cercos)
12. Not used recently as nursery
    (recentamente no usado como sitio para vivero)
13. Sufficient size for anticipated seedling demand - expansion
    (suficiente tomario para producir las necesidades futuras - expansión)
14. No weeds
    (sin maleza)

SESSION X

Exercise I

Factors to be Considered in Nursery Sites

Total Time: 2 hours

Overview

Building on knowledge that the group has, the trainers will attempt to determine factors to be considered in planning a possible nursery site.

Procedures

Time	Activities
10 minutes	1. Nursery teams are introduced. Trainer explains that teams have been chosen, as a result of staff observations of how they have worked individually over the last three days. They are unchangeable and non-negotiable. Strengths have been taken into consideration as well as areas where people need strengthening. Lastly, role models that we as trainers felt others could benefit from through observation of their working styles. If anyone is curious as to why they are in groups they are in, they can ask privately and will be given information.
45 minutes	2. Trainer instructs nursery teams to get together and list on newsprint those factors that they feel are important in the choosing of a site for establishing a forest nursery.
30 minutes	3. Group now makes presentation to large group and each presentation is questioned and discussed by forester/trainer and other group members.
15 minutes	4. Forester/trainer now presents summary lecture: He/she then puts the following on newsprint.

5. Forester/trainer explains that you will not always, if ever, find everything in one site. He then moves to next newsprint as follows.

Nursery Site Trade-Offs

1. What is really important?
2. With what can you live?

6. Forester/trainer now moves into planning the layout of a nursery.

Layout of nursery:

Contiguous group of seed beds to facilitate ease of working and irrigating.

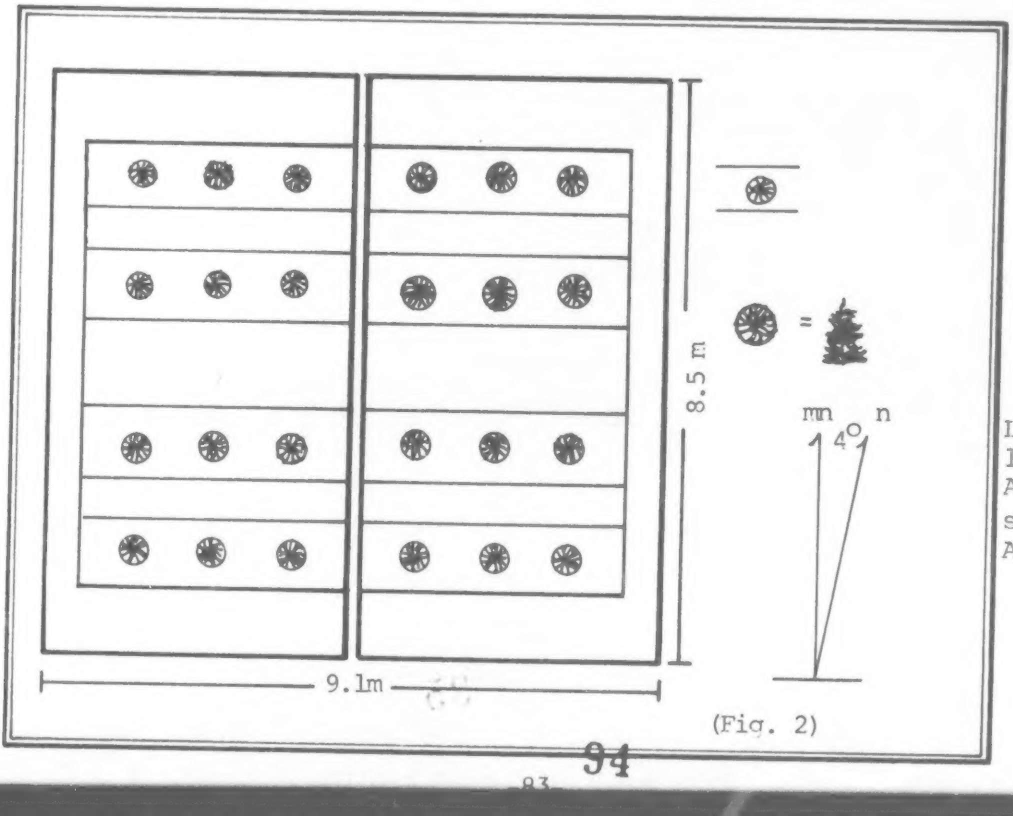
15 minutes

a. Built-up 15 - 20 cm,

b. 1-1.3 meters wide.

walkways: 40-80 cm - ease of access.

Peace Corps Nursery (Conocoto, Ecuador)

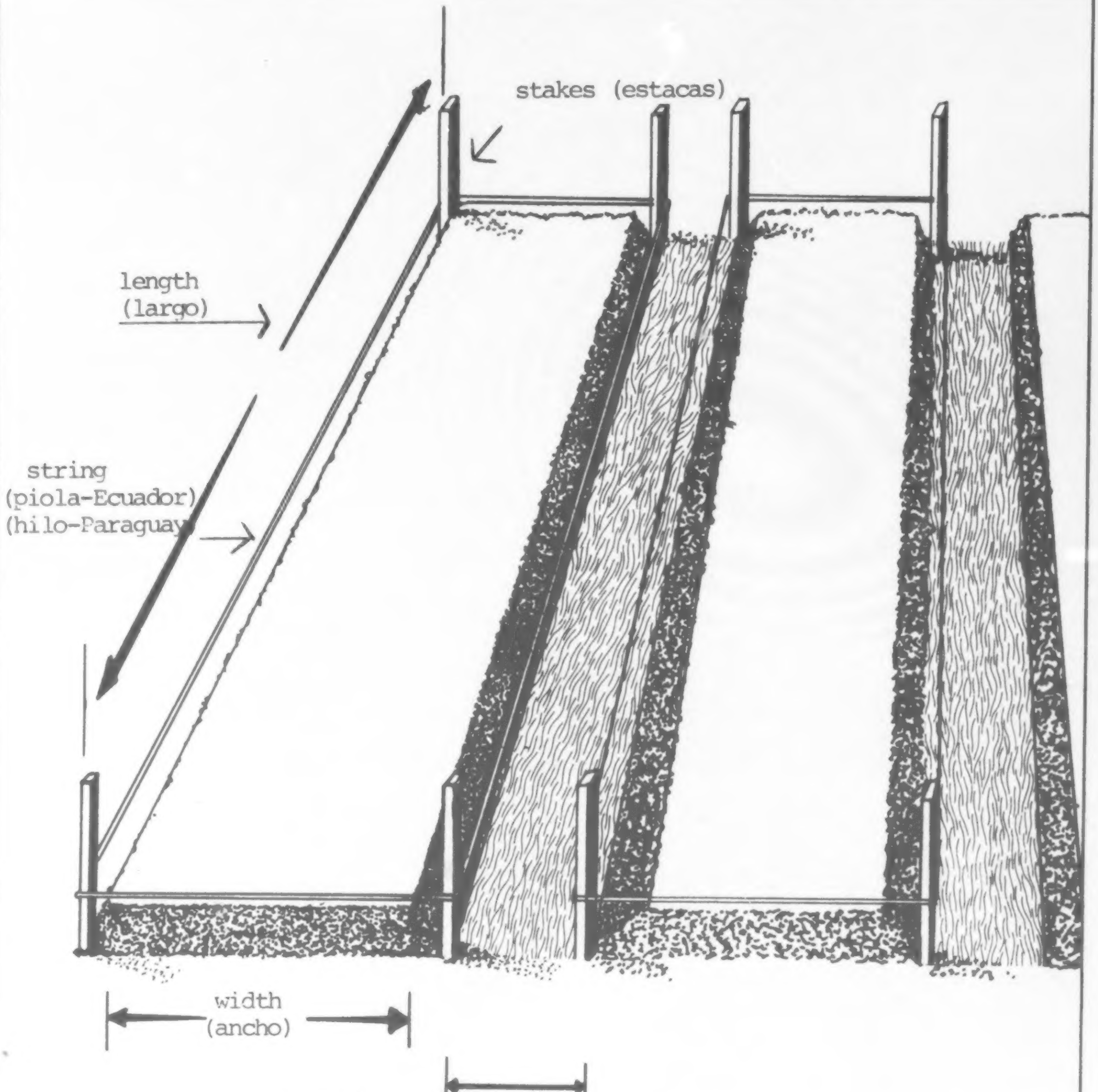


Legend:
1cm - 1m
Area - 77.35m^2
slope - 5%
Aspect - North

(Fig. 2)

LAYOUT OF NURSERY

(TRAZADO DEL VIVERO)


stakes (estacas)
length
(largo)
string
(piola-Ecuador)
(hilo-Paraguay)
width
(ancho)
walkway
(camino)

Other words (otras palabras)
crosswise - (a través)
lengthwise -(a lo largo)
row - (hilera, fila)
seed bed - (plantabanda, tablón)

(Fig. 3)

SESSION X

Exercise II

Location of Nursery Site and Planning

Total Time: 2 hours

Overview

In this exercise, leadership ability to organize and ingenuity of group members is highlighted. Trainees are given rough idea of possible site location. Trainers leave area and are not available to group as they decide on site and draw up plan. Trainers return and review site plan and help group look at their own process.

Procedures

Time | Activities

1. Trainer identifies area near training center, shows sketch map area, tells trainees that they are to plan a vivero in that area somewhere. Instructions written are:

1½ hours

Each row will be 4 meters long, each vivero group will be responsible for one row.

Now plan the layout; when trainees have the vivero area planned, bring it to trainer and have it checked. All trainers now leave without answering any further questions.

2. Trainers return to center and ask to be told about the group process. Some possible questions are:

30 minutes

   1. Who took charge of the overall project? How did they do it?
   2. What problems did they have or are still having?
   3. Is everyone satisfied with the plan?
   4. How did the vivero groups communicate and interact with each other?
   5. How were decisions made?

3. Trainer summarizes the morning activities.

Spanish Language Class

Total Time: 1½ hours

Overview

Same as session four

Procedures

Time	Activities
1½ hours	1. Conversation 2. Grammar 3. Sentence construction

Vocabulary

Moderate slope - pendiente moderado
Drainage - drenaje
Watering - riezo
Good soil - buen suelo
Frost free site - sitio sin peligro de escarchas
Protected from winds - protección contra el viento
No large trees near - sin arboles grandes muy cerca
Near water - cerca de agua
Good labor supply - disponiblidad de mano de obra
Transportation close by - cerca de transportación
Permission of owner, written - permiso por excrito
Caretaker - cuidador
Fencing - cercos
No weeds - sin maleza

Cultural Values

Total Time:

Goals:

- To get in touch with our own value system.
- To see what we have learned so far about host country cultural values.
- To explore commonalities and differences.
- To find ways of accepting cultural differences.

Overview

In this session, trainees will be asked to list their own cultural values. For many this will be a repeat, but the purpose here is to see how many more of their own values they have identified since living in host country and to look at host country cultural values, so that trainees can begin to see commonalities and differences. Finally, trainees will be seeking ways to accept the differences. This lays the ground work for extension work training later in the program.

Exercise

1. Cultural value explorations: mine, ours, theirs, acceptance.

Materials

Flip charts, marker pens, tape.

Exercise I:

Cultural values: An Exploration - Mine, Ours, Theirs, Acceptance

Total Time: 1 hour 45 minutes

Overview

To explore different cultural systems. Find ways to accept the differences.

Procedures

Time	Activities
5 minutes	1. Trainer posts on newsprint the following diagram: BELIEFS CULTURE VALUES BEHAVIOR Give a brief lecture stating that values are not good or bad that they just are. The reason we want to take a good look at our cultural values in this session is to start at just basically a very general point - culture. The unique lifestyles of a particular group of people is a learned behavior that is communicable. We are able to see two very key concepts of culture. It is communicable, thank goodness. It means you can learn something about it. Because if it were not communicable, we would have nothing to do here today or for the rest of your volunteer service. To learn about the behavior of others is also very meaningful, not only in a social sense, but in a management sense, because I think it is important for people to understand the influence that environment has on culture, on you and understand that you are not "born" with a culture. You can be born into a culture but you are not born a culture,

if I could make that distinction. Another positive aspect of learned behavior says to us that we can also not only broaden our appreciation of other cultures but broaden our ability to participate in other cultures, in another cultural milieu.

To start our participation in this culture we need to go back to ourselves and then come forward.

2. Trainer asks trainees to make a list of
their own cultural values. You may have
done this before so it will be easy.
15 minutes You may also notice that you have gotten in
touch with values you were unaware of
since coming to host country.

3. Trainer now asks participants to form
groups of four. Share their lists of
30 minutes cultural values and look for similarities
and differences in their lists.

4. Trainer now asks group to share their
differences and write them on newsprint.
15 minutes Then asks for ways in which we accept
differences in our own culture.

5. Trainer now asks groups to list as many
cultural values of the host country as
they can. Trainer asks that after they
20 minutes have completed this list, they once again
check for commonalities and differences.

6. Trainer now asks the groups to make a
15 minutes list on newsprint of ideas they may have
for accepting these differences.

Trainer's Note: List generated from pilot program is included as a guide.

7. Trainer now requests that small groups
share with large groups their ideas.
15 minutes Trainer now leads discussion of how these
ideas can be used in the volunteer
experience.

List of Ways of Accepting Differences

- Adjust to environment.
- Have respect for culture and customs.
- Cultural sensitivity.
- Patience.
- Be outgoing.
- Empathy.
- Introspection.
- Be flexible enough to (tolerate, accept) values different from our own.
- Educate ourselves to explain motives for values.
- Realize our values are as different to them as theirs to us.
- Conformity/compromise.
- Understanding that the differences are deeprooted and cultural.
- Ability to modify outward behavior without modifying inward values.
- Keep an open mind, culturally and personally.
- Good sense of humor (able to laugh at self).

Soil Preparation, Seed Bed Sowing, and Reproduction by Clippings

Total Time: Approximately 4 hours

Goals:

- To define summarizing as a communication skill, and to make this skill explicit in participants' minds.
- To give information about soil preparation, seed bed sowing and reproduction by clippings.
- Review trainees plan for vivero. Have trainees start laying out nursery.

Overview

In this session information about soils is given as a refresher for some trainees and as new information for others. Participants' vivero plan is reviewed and trainer/forester makes suggestions and gives approval for participants to start laying out nursery. Summarizing as a skill is put in this session to have participants summarize where they are technically and realize the value of this skill in technical learning.

Exercise

1. Summarizing,
2. Lecture on soil preparation, seed bed sowing and reproduction by clippings,
3. Review of trainee vivero plan and laying out of vivero.

Materials: Flip charts, marker pens, tape, string, shovels, rakes, "Power in the Willow" article.

SESSION XIII

Exercise I: Summarizing

Total Time - 20 minutes

Overview

This exercise is designed as a short, quick energizer/change of pace and is used in conjunction with the technical training session. It is done by the technical trainer as a way of integrating a skill which can be used for technical learning. This is the first introduction of this exercise and it will be used later in the program.

Procedures

Time	Activities
2 minutes	1. Technical trainer asks participants to check over the technical training of the past three days and try to prepare in their minds, a way to explain what has happened and what they have learned so that they can inform someone else about it.
5 minutes	2. Technical trainer now asks participants to form into pairs, preferably with someone who has a different technical training experience (i.e., generalist with forester). One person explains his technical training experience of the past three days while the other person listens and then summarizes his/her partner's presentation. Then people switch roles and repeat the process.
10 minutes	3. Bring the group back together and discuss the experience by asking: o What if anything caused difficulty? o How did it feel after you were speaking, then hearing the other person try to summarize your content? o What do you have to work on to be a better summarizer? o What are some of the advantages and disadvantages of summarizing?
2 minutes	4. Technical trainer asks group: o What can we say about summarizing as a communication skill?

1 minute 5. Close by stating that we will return to practice summarizing as a skill from time to time in technical training and will also use it in language training.

Exercise II

Soil Preparation, Seed Bed Sowing, and Reproduction by Clipping.

Total Time: 1½ hours

Overview

In this exercise, the technical trainer gives a lecture on soil preparation, seed bed sowing and reproduction by clipping. For many participants this will be a refresher session and the technical trainer should ask people to make comments about experiences they have had. In this session the discovery of the "willow rooting substance" is introduced. Since this was published in September 1981 the article is passed out to trainees for their information (article at end of this exercise).

Procedures

Time	Activities
	1. Technical trainer gives lecture using the following outline. It is recommended that outline be placed on newsprint and displayed as technical trainer teaches various stages of outline during the lecture. Newsprint outline helps hold attention.

SOIL PREPARATION

1. Soil might have to be sterilized if there exists a danger of disease by:
    a. boiling water
    b. acid treatment
    c. heating soil on steel plate

2. Might be better to move site,

3. Chemical sterilization,

4. Fertilization medium to be mixed with soil according to need,

5. Organic material might have to be added to help retain soil moisture and/or improve texture. The following are possibilities:
    a. compost
    b. straw
    c. chopped pine needles (dry)
    d. sawdust (aged)
        1. toxic effect?
        2. nutrient loss?

    (Organic material could contain weed seeds and/or fungi or insects).

6. Mycorrhiza,
7. pH 6.5 (slightly acid).

SOWING

1. Across the bed - facilitates weeding

2. Make your own seed "trench":
    a. board
    b. depth of trench (see drawing on following page)

3. Sow sand in seed trench (optional),

4. Sprinkle seed in trench,

5. Number of seeds/meter:
    a. size of seedling,
    b. plant species,
    c. germination prospects,
    d. 1 viable seed/cm.

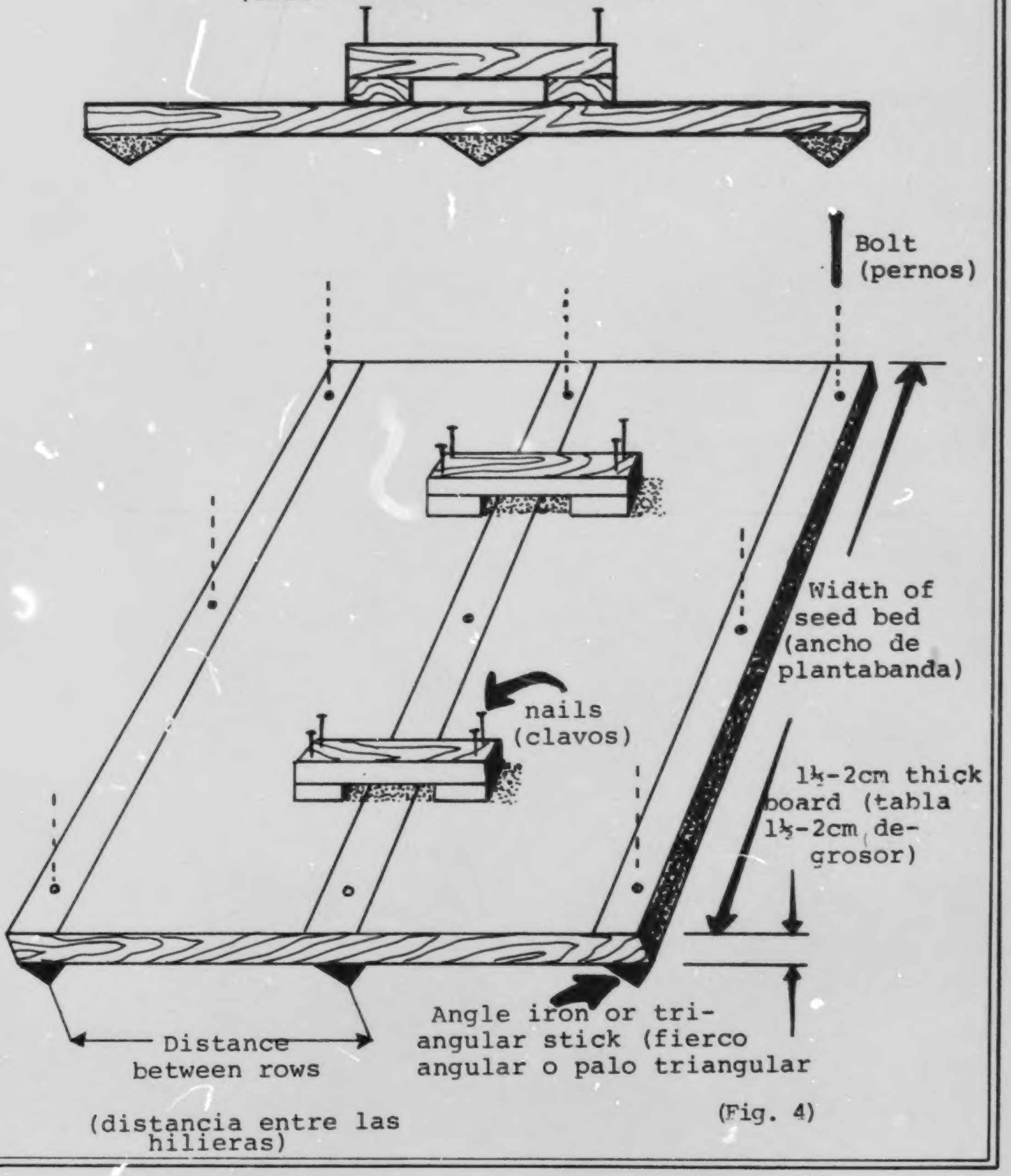
6. Cover with sand or dirt,

7. Water heavily after sowing,

8. You may put straw over beds - for protection against birds and moisture retention.

BOARD FOR MAKING SEED CANALS

(TABLA PARA HACER LOS SURCOS)


Bolt
(pernos)
Width of
seed bed
(ancho de
plantabanda)
nails
(clavos)
1½-2cm thick
board (tabla
1½-2cm de-
grosor)
Angle iron or tri-
angular stick (fierco
angular o palo triangular
Distance
between rows
(distancia entre las
hilieras)

(Fig. 4)

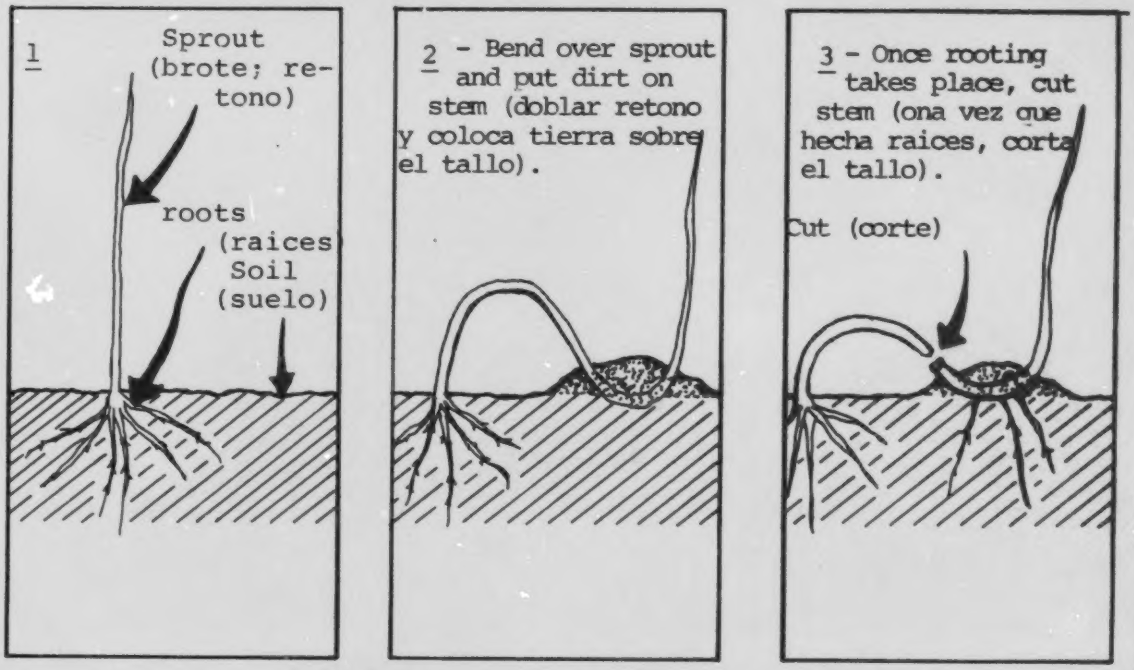
REPRODUCTION BY CLIPPING

1. Sprouts cut and stuck in ground (brotes)(retoños),
2. Redwood - not effective,
3. More experimentation needed in hardwoods,
4. Rooting medium,
5. Other:
    a. layering
    b. moss-soil (usago) around sprout (brote).
6. Willow sprout method,
7. Horticulture:

    roots (raices)
    fertilizer (abono)

VEGETATIVE REPRODUCTION - LAYERING

(REPRODUCCION VEGETATIVA)


1
Sprout (brote; retono)
roots (raices
Soil (suelo)
2 - Bend over sprout and put dirt on stem (doblar retono y coloca tierra sobre el tallo).
3 - Once rooting takes place, cut stem (ona vez que hecha raices, corta el tallo).
Cut (corte)

(Fig. 5)

ORGANIC DISCOVERIES

JEFF COX

September 1981. Organic Gardening

Power in the Willow

THE COMMON willow evidently contains a substance, which you can extract and use at home, that far surpasses synthetic plant hormones in its ability to stimulate almost any plant into rooting.

That means hard-to-root trees like beech, cherry, pine and oak – to say nothing of vegetable cuttings, flower slips and woody ornamental bushes – now may be routinely turned out from our potting sheds and windowsills.

The discovery of the "willow rooting substance," as Dr. Makota Kawase, professor of horticulture at the agricultural research center in Wooster, Ohio, calls his finding, was an accident. (Ever notice how many scientific breakthroughs are the result of accidents? I finally know why: If scientists could define what it is they're looking for, they'd have already found it. It's when they're looking for something else that they find what they seek.)

An experimental team was using water from a basin where willow twigs were soaking to moisten soft wood cuttings in a centrifuge. The softwood cuttings sent out extraordinary numbers of roots. In tracing why, the scientists found the willow rooting substance – which may turn out to be "rhizocaline" (literally, "root-stimulator"), a hypothetical substance that scientists long felt must exist, even though they'd never found it.

Is willow rooting substance the long-sought rhizocaline?

"They share many characteristics," says Dr. Kawase. Willow rooting substance is a "remarkably strong root-promoting agent. A crude extract from only a third of an ounce of willow twig stimulated production of 12 times as many roots per mung bean cutting as controls in plain water. At the highest concentration tested, the willow rooting substance could easily produce more than 100 roots in the two-inch stem of mung bean cuttings, while control sections produced only four or five roots. Alone, it seems to have the ability to stimulate rooting unmatched by any previously known rooting substance, including plant hormones." Commercially available rooting preparations are usually synthetic plant hormones.

[redacted] willow rooting substance is *not* a plant hormone. Its root-promoting effect increases sharply when it's applied to cuttings along with plant hormones, however, and this is another important link to the true rhizocaline."

stance?

Yellow birch cuttings are known to be almost impossible to root. In one study, yellow birch cuttings treated with plant hormones produced no roots at all. When the hormones were combined with a water solution of willow twigs and applied to the cuttings, 100 percent of them rooted. These tests also showed significant results with bittersweet, forsythia, peach and spirea.

Dr. Kawase says use of willow rooting substance could mean an end to the time-consuming bedding and transplanting now needed for propagation of woody plants. Using it during routine transplanting of potted plants could ease shock and reduce plant loss by stimulating new root growth. He even suggests we try it on seeds before planting.

To make an extract of the willow rooting substance at home, gather current-year willow shoots, remove the leaves, and cut the shoots into short pieces – an inch or less. Pack as many as you can into a container, such as a cup or mason jar. Cover with water and use a lid or plastic bag to prevent evaporation. Let it sit for about 24 hours, then drain off the liquid for use.

For softwood or herbaceous plants, place the cuttings upright in a container with willow extract in the bottom. Allow them to absorb the extract, adding more if needed, until about 24 hours have passed. Then root them normally in soil. As usual, a plastic tent over the potted cuttings will prevent them from drying out. If you're dealing with a plant that ordinarily roots well in water, try rooting it in willow water.

Now that I think of it, willows always *were* the easiest plants to root – just stick slips in the ground, keep them moist, and they take hold. Maybe now we can transfer something of the willow's rooting power to our other plants. ☐

BEST COPY AVAILABLE

Exercise III

Review of Trainee Vivero Plan and Layout of Vivero

Total Time: 2 hours

Overview

In this exercise the technical trainer reviews trainees' vivero plan and provides comments about the process of arriving at the plan. Trainees will then proceed to the vivero site and start laying out their nursery.

Procedure

Time	Activities
15 minutes	1. Technical trainer reviews vivero plan. Makes recommendations and points out work that is excellent and that which is not so good. Discuss with group that this vivero will be their responsibility during the rest of training. They will layout, prepare soil, sow seeds and keep the nursery watered. No one will remind them, but trainers will check progress from time to time.
1 hour 45 minutes	2. Trainees are now instructed to go and layout nursery. They are aware of where tools are kept. No further instructions are given. Once again trainers become unavailable.

Trainer's Note: There will be more trainees than space with which to work. Groups will have to negotiate use of tools and space with each other.

Time	Activities
5 minutes	3. Trainers arrive and check out nursery layout. Observations are made about group work at the site. Nothing is said about process at this point. Trainers collect data.

111

Spanish Language

Total Time: 1½ hours

Goals: same as session four

Overview

In this session, trainees should be able to explain to instructor the methods for laying out a vivero in Spanish.

Procedures

Time	Activities
1½ hours	1. Group explanation of laying out a vivero
	2. Grammar exercise
	3. Sentence construction

Vocabulary

Bare root - raiz desnuda
Disease - enfermedad
Drainage - drenaje
Fertilizer - abono, estiercol, fertilizante
Irrigation - riego
Lumber - madera aserrada
Nursery - vivero
Sample plot - parcela de ensayo
Raw - surco
Run-off - escurrimiento
Seedbed - plantabanda, semillero
Site factor - factor local; calidad de rodal
Soil - suelo
Sowing - siembra
Shovel - pala, palana
Rake - rastro, rastra, rastrillo
Dig - cavar

SESSION XV

Communication through Illustration

Total Time: Two hours

Goals:

- To show trainees simple drawing techniques.
- To have trainees understand the importance of being able to illustrate what they are saying verbally.
- To have trainees practice drawing.
- Simple poster drawing techniques and use of other materials for making posters - illustrated by trainer, then posters are made by trainees.

Overview

This session introduces the importance of illustration as a communication technique. In future sessions trainees will be expected to use illustrations as part of the presentations. The importance of using visual aids while talking to a group is also emphasized.

Exercises:

1. Communication through illustration.

Materials: Flip charts, marker pens, tape, crayons, glue, old magazines, scraps of material, felt pieces, candy bars for prizes.

Exercise I

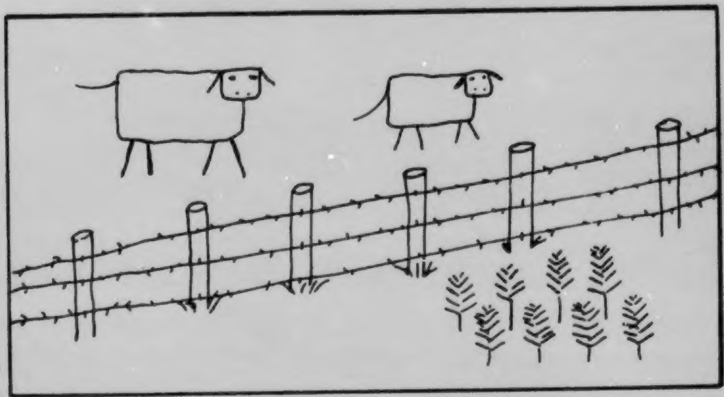
Communication through Illustration

Total Time: 2 hours

Overview

This exercise tends to be a lot of fun and the trainers have to keep a focus on communication aspects of the exercise. Volunteers frequently have to give charlas to school children, groups, and on formal field days. It is important that participants see the value of holding a group's attention through the use of illustrations.

Procedures

Time	Activities
5 minutes	1. Trainer introduces session with short lecture about using visual aids. Explains that in the campo, the more sophisticated forms of visual aids are not available and trainees must rely on their own ability to make these aids. Trainer should point out that the use of newsprint during the program is employing a visual aid (implicit group memory).
15 minutes	2. Trainer now draws a series of stick figures on newsprint (may want to have light pencil outlines to go over). Trainer now asks trainees to draw a set of stick figures of their own for practice.
1 hour	3. SAMPLE ILLUSTRATION - for keeping cows out of field by fencing 

Trainer explains that it is O.K. to make people laugh by your drawings; as long as you get your message across. Getting people to laugh helps them remember. Trainer explains that we are now going to draw a poster with a message about planting trees. Trainees are instructed to put time and thought into this project as they will have to do this many times during their volunteer service. Trainer tells trainees that there is a table of different materials that may be used for this project. Each trainee makes a poster. When they are done posters are to be hung on the walls. This is a contest and there will be prizes awarded. Awards will be given on:

- Best presentation of message,
- Most creative use of materials,
- Best effort by non-artistic person,
- Honorable mention in the above categories.

30 minutes

4. Participants are asked to describe their posters if the message is not clear. Suggestions are given by both trainers and trainees. Trainer discusses the various design possiblities exhibited. Trainer states that all presentations during the remainder of the training program are expected to be accompanied by visual presentations. Therefore, materials will remain where trainees can have access to them.

5 minutes

5. Trainers and any guests you invite meet and decide on awards. Candy bars are given out.

SESSION XVI

Fertilizers, Watering and Containers

Total Time: 4 hours

Goals:

- To give information about fertilizers, watering and containers.
- Have trainees actually practice making paper containers and transplanting seedlings.
- Trainees finish soil preparation and possibly sow seed beds in vivero.
- Give out weekly evaluation forms.
- To review group process and have trainees give each other feedback.

Overview

This session once again will be a refresher for some participants but uniquely different ways and types of fertilizers used will hold interest. Containers used in Latin America differ significantly from North America. Practice in making containers and transplanting into containers will be a new experience for most trainees. Trainees will continue work on vivero and give each other feedback on working together. Weekly evaluation forms will also be given out so that trainees can fill them out and bring them to their individual interviews (Session 18).

Exercises:

(1) Lecture on fertilizers, watering and containers.

(2) Making containers and transplanting seedlings into these containers.

(3) Soil preparation and sowing of seeds in vivero.

Materials: Flip charts, marker pens, tape, weekly evaluation forms, newspaper (for pot making), staplers, staples, potting soil, seedlings for transplanting into containers, seeds for vivero.

Exercise I

Lecture on Fertilizers, Watering and Containers

Total Time: 30 Minutes

Overview

At the beginning of this exercise technical trainer will take a few minutes to pass out weekly evaluation forms. He will then invite those for whom this lecture is a refresher to add pertinent information based on their experiences.

Procedures

Time	Activities
5 minutes	1. Technical trainer passes out weekly evaluation forms. He asks that participants have them filled out by next day in time for interviews and states that these are an important part of the feedback needed by trainers.
25 minutes	2. Technical trainer now gives the following lecture using an outline posted on newsprint.

Fertilizers
(Fertilizante)

Work from soil sample. Trainer describes ways in which to take soil sample and quantity needed for each host country soil lab processing.

1. Inorganic (inorganico)
   a. NPK
      N=Nitrogen (nitrogeno)
      P_2O_5=Phosphoric Acid (acido fosforico asimable)
      X.44=P
      K_2O=Potash (potasa soluable en agua)
      X.83=K

      Ratios 10 - 20 - 10

   b. Urea
   c. Ethers

      1. ammonium sulfate
      2. ammonium nitrate

2. Organic (Organico)

   a. compost: good if done right
   b. green manure

      1. alfalfa (alfalfa)
      2. peas (arvejas)
      3. beans (frijoles)
      4. cloves (trébol)

   c. manures

      1. usually low in phosphorus
      2. best to mix in soil

3. Application

   a. organic mix into soil
   b. inorganic - mix into soil or sprinkle on:

      1. 1st application
      2. 2nd application after 6 weeks
      3. do not fertilize during hardening off period (± final month before outplanting).

Watering

1. After sowing, "carefully" water heavily.

2. Generally, watering heavily every few days is better than watering lightly everyday.

3. "Look" at soil moisture.

4. In the last month, taper off watering to harden plants.

Containers

Types

1. Paper*
2. Plastic bags
3. Clay pots
4. Better system

    a. Direct seed into container

        1. Advantages

            a. root system remains intact,
            b. has good soil.

        2. Disadvangages

            a. bulky to handle,
            b. poor root development,
            c. costly.

---

*Paper pots including labor is ½ the price of using plastic containers.

Small Research Projects

1.1 Sameness: Try to keep all factors, that might influence the experiment the same. Examples of questions to ask about the experiment:

Seed Experiment — a. Are the seeds that are being used from the same source?

Growth Experiment — b. Is the soil the same throughout the experimental site?

Planting Growing Experiment — c. Were all trees planted on the same day using the same methods, tools etc.?

1.2 Randomness: As a means of limiting the effects of unknown differences, experiment should be layed out randomly.

a. Rice-Beans scatter on a grid,

b. Number from a hat,

c. Telephone book - last digits of numbers,

d. Random number generator.

1.3 What is it you are going to measure? How? When? With what?

1.4 Testing Hypothesis

1.5 Layout: A block design

a. Randomized blocks,

b. Buffer strips,

c. Replicates (generally 3 - 5 replications),

d. Number.

Example: Species Trial

Problem: It is decided to test 7 different species to see if any grow and/or survive better than Pinus radiata.

Measurements to take: (by year)

1. Survival: Note if trees are dead or alive.

2. Height Growth: Note height of each tree.

Exercise II: Making Containers

Total Time: 1 hour

Overview

This exercise gives trainees practical hands on experience in making paper containers and transplanting into them. If training is done at host country Ministry of Agriculture nursery, they will have a potting shed with all of the equipment needed. If not, a small potting shed can be created for the exercise.

Procedures

Time	Activities
20 minutes	1. Trainer or potting shed "jefe" demonstrates the making of newspaper cylinder. Trainer now makes 10 cylinders each.
40 minutes	2. Trainees take cylinders to potting shed where they are shown how to pack potting soil tightly and to transplant seedling into pots.
	3. Trainer gives brief lecture on the advantages of paper pots.

Trainer's Note: If possible, you can get the nursery "jefe" to give all instructions in Spanish and oversee the trainees in this exercise. You will then only need to translate information that you may feel trainees are not understanding. This gives trainees the experience of working with a host country person.

Directions for making paper cylinder containers.

1. Take a standard size sheet of newspaper fold in half, then fold in half again.
2. Roll folded paper around fingers to give cylindrical shape.
3. Staple top and bottom.
4. Roll over fingers to make cylinder.
5. Pack bottom tightly with potting soil using tamping stick.
6. Transplant seedling packing soil tightly around roots, pack up to collar of seedling.

Exercise III

Soil Preparation & Seedling Sowing

Total Time: 2½ hours

Overview

This exercise is meant to be the last formal time period allotted for work on the trainees' vivero. However, if the weather and their own group process does not allow for the final seedbed sowing, it is possible to finish on the next day.

Procedures

Time	Activities
5 minutes	1. Trainer starts with observation made by staff members as to how vivero groups have done while working together. Asks trainees to verify these observations. Observations are listed on newsprint.
30 minutes	2. Trainer asks vivero groups to come together and give each other feedback about: o how they work together, o how they feel about the amount of work others have done/not done, o how they feel about the leadership in the group, o how they feel they have worked with other vivero groups, o how they feel about themselves as a group now.
10 minutes	3. Trainer asks group to call out adjectives that describe themselves and writes them on newsprint. Talks about the importance of feedback in the group process.
1 hour 45 minutes	4. Groups are now given instructions to finish vivero. Trainer asks who is keeping records but makes no comment on the answer. Trainers once again leave the vivero area, leaving seeds with trainees.

Spanish Language

Total Time: 1½ hours

Goals: Same as session four.

Overview

Trainees continue to discuss vivero project. This session describes to instructor, various ways to fertilize the vivero. Watering methods and containers are covered also.

Procedures

Time	Activities
1½ hours	1. Trainees discuss fertilization, watering and containers in Spanish.
	2. Grammar.
	3. Sentence construction.

Vocabulary

Fertilization - fertilización
Inorganic - inorganico
Nitrogen - nitrogeno
Phosphoric acid - acido tosrorico asimable
Potash - potasa soluable en agua
Alfalta - alfalfa
Peas - arvejas
Beans - frijoles
Clover - trébol
Fertilizer - abono, estiercol, fertilizante
Growth - grano
Intolerant - intolerante
Mortality - mortalidad
Packing (nursery stock) - embalaje
Plantation - plantación
Planting stock - plantas destinadas a la plantación
Pot (transplant) - maceta
Seed tree - arbol productor de semillas
Spacing - espaciamiento
Transplant - transplante
Transplant bed - plantabanda de transplante.

SESSION XVIII

Protection and Record Keeping

Total Time:

Goals:

- To give information about the protection of vivero from animals, disease, weeds and insects.
- To go over record keeping practices once again.
- To have trainees decide on standard record keeping format.
- To summarize week long activity of establishing a vivero.

Overview

This session completes the technical training in establishing a forest nursery. Trainees will have the satisfaction of having planned, laid out, prepared soil and finally sowed the seeds in their own nursery. Also record keeping is gone over and trainees decide on a standard format for keeping nursery records. Protection of a nursery is discussed in depth.

Exercises:

1. Lecture on protection and summary of week's vivero activity.
2. Record keeping practices - decision making.

SESSION XVIII

Exercise I:

Protection of Vivero and Summary of Week's Activities

Overview:

This is the final exercise focusing on establishing a nursery. Trainer will give lecture on protection and summarize steps taken in the establishment of a nursery (there is additional time allotted in this session if nursery beds are not yet sown).

Procedures

Time	Activities
30 minutes	1. Technical trainer gives lecture on protection from outline posted on newsprint. Outline follows:

Protection

1. Small animals (animales pequeños)

   a. mice/rats (ratas y ratones)
      - rat poison (veneno) cats (gatos)

   b. rabbits (conejos) sling shots (hondas)

   c. chickens (gallina, gallos)

2. Large animals (animales grandes)

   a. goats/sheep (chivos, ovejas, baorrego)

   b. pigs (chanchos)

   c. cows (vacas), horses (caballos), cattle (ganado)

   d. dogs, etc. (perros, etc.)

3. Birds

   a. sowed seed (la semilla sembrada)

   b. new seedling (la planta nueva)

   c. as control - insects (como control - insectos)

   d. bird control (control de aves)

      1. chemicals (quimicos)
      2. screens (pantalla de tela metalica)
      3. sling shots (honda)
      4. tin cans (latas)

4. Disease - damping off

   a. pre-emergence

      1. sterile soil
      2. sun and sterile sand
      3. keep pH moderately acid
      4. boiling water

   b. in roots

      upper part of roots infected, plants fall over, stems turn watery inside.

      1. water schedule
         - i. less often
         - ii. time of day
         - iii. chemicals

5. Weed control (control de maleza)

   a. herbicides

   b. other
      1. boards (tablas)
      2. burlap (arpilera)
      3. straw (paja)

c. weeding

    1. weed early: late weeding is very costly
    2. use in compost

6. Insects (insectas)

    a. grub worm (eats roots)
    b. cut worms
    c. aphids
    d. nematodes
    e. spiders, mites, thrips

Exercise II

Record Keeping

Total Time: 1 hour 45 minutes

Overview

This exercise stresses the importance of record keeping; ask what data the trainees have and how they are going to record it. Finally, trainees will go through a decision-making process about standardizing a record-keeping method and preparing a form.

Procedures

Time	Activities
10 minutes	1. Technical trainer starts this session by saying "remember yesterday when I asked you who was keeping records for the vivero?" Trainer then makes remarks about the first exercise on record keeping and its importance. Trainer now has two choices; he can (1) congratulate the participant or participants that have taken responsiblity for keeping records or (2) make the point that participants must take responsibility for keeping records, realizing that all parts of training build one on the other.
10 minutes	2. Trainer now asks group what data they need to record for the vivero they have just established. Trainer records data titles on newsprint.
	3. Trainer now says "I feel you are ready to decide on a standard format for recording nursery data. Please do so."

Trainer's Note: No directions are given about procedure or how to break into group(s). Trainers remain in room and observe trainees organizing the project.

15 minutes	4. Trainer comments on the organization process which he and other trainers have just observed. Ask for comments from trainees about their own feelings over the last hour.
10 minutes	5. Trainer now makes remarks about data recording form, additions and/or deletions.

Individual Interviews

Total Time: 15 minutes per interview

Goals:

- To give each trainee time with a trainer to go over the week's learnings.
- To give training staff collective feedback from trainee.
- To receive feedback from trainee on program and trainers' performance.

Overview

The purpose of this session is to give each trainee, individual time with trainer to go over their learnings of the week. To give each trainee feedback from the staff based on evaluation criteria given to them in session one. To receive written evaluation from trainees and to get oral feedback on training program and trainers' performance.

Procedures

Time	Activities
	1. Trainers divide group by number of trainers and assign trainees to each trainer for interview. List should be divided so that each trainee will be interviewed by each trainer at least once during training program.
	2. Interview schedule is posted in training room.
	3. Trainer interviews each trainee; first, by giving trainee feedback from staff on assessment criteria and secondly, by giving weekly evaluation form a cursory glance to pick out areas that trainer may feel needs to be discussed. Trainer asks for feedback that trainee may have for staff.
	4. Immediately after last interview, trainers meet together and discuss interviews, highlighting potential problem areas. Trainer should report on trainees who they feel are of particular concern to determine what, if any response they made to staff as feedback.

Weekly Evaluation Form

1. I have gained the following

____

____

____

____

____

2. On a scale of 1 to 10 my learning this week has been a_

____

3. This week has been (respond to all that applies)

________informative
________motivating
________a rehash
________too much in too little time
________unnecessary
________valuable
________a waste of time
________a stone drag

4. This week has (respond to all that applies)

____challenged me
____reinforced my technical skills
____made me more confident
____enabled me to polish communication skills
____improved my group interaction skills

5. Feedback on the training program.

6. Feedback to trainers.

7. Things I would like to see included in trainng program.

SESSION XX

Planting Trees

Total Time: 3½ hours

Overview

In this exercise trainees start at the nursery, watching the lifting, packing and transporting of seedlings. If possible, they can participate in this operation. They then transport trees to planting site. The planting plan has been done by one of the trainees under the supervision of the technical trainer. Each trainee plants trees and teaches a school child to plant a tree.

Procedures

Time	Activities
45 minutes	1. Trainees go to nursery and watch seedlings being lifted, packed and put in truck for transport. Pick up tools for planting.
20 minutes	2. Trainees now go to planting site where participant who has previously laid out plan for planting trees explains where trees are to be planted.
2 hours	3. Trainees now plant trees. School children accompany trainees and also plant trees with the help of trainees.
	4. Trainees return to traininng center and replace tools.

Trainer's Note: Technical Forester moves from group to group being sure children are integrated into each group. Trainer offers pointers on how to get children involved.

Planting Trees

Exercise I Charla: Como Plantar

Total Time: ½ hour

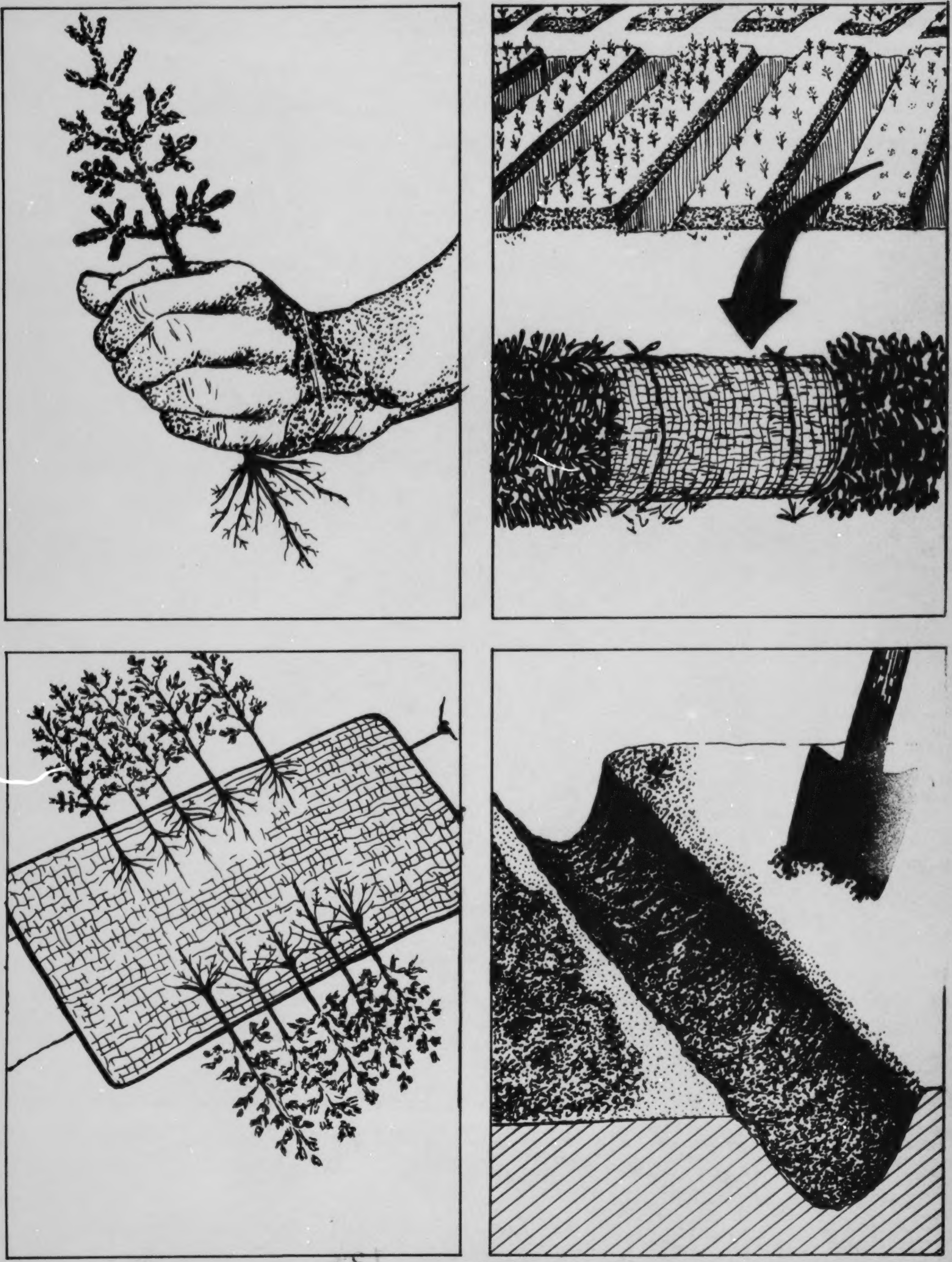
Overview

This exercise is conducted in Spanish using illustrations to ensure that trainees understand the content. The purpose is for technical trainer to model an appropriate charla for instructing campesinos in how to plant trees.

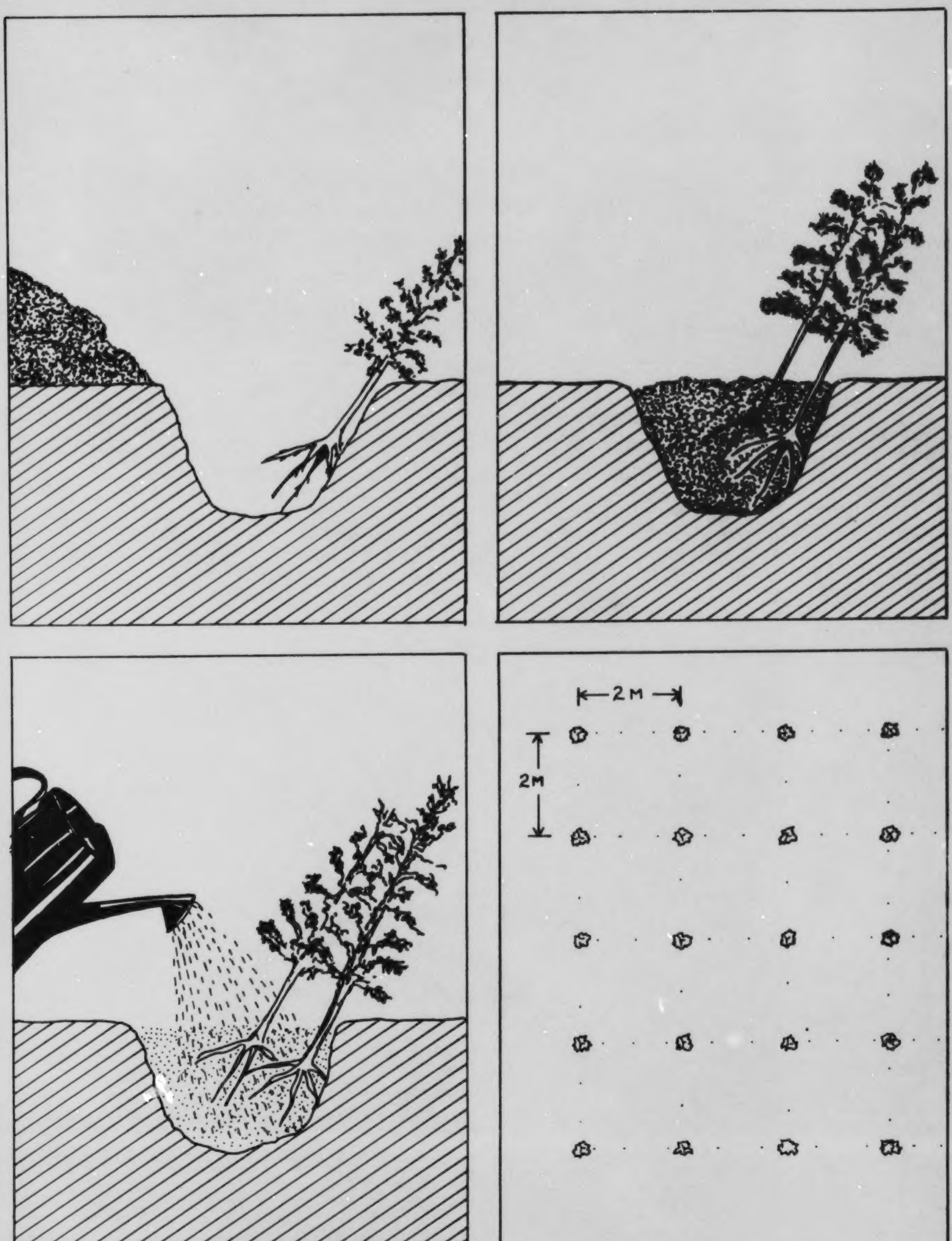
Procedures

Time	Activities
	1. Technical trainers draw the following series of drawings on newsprint. Then gives total lecture using Spanish.

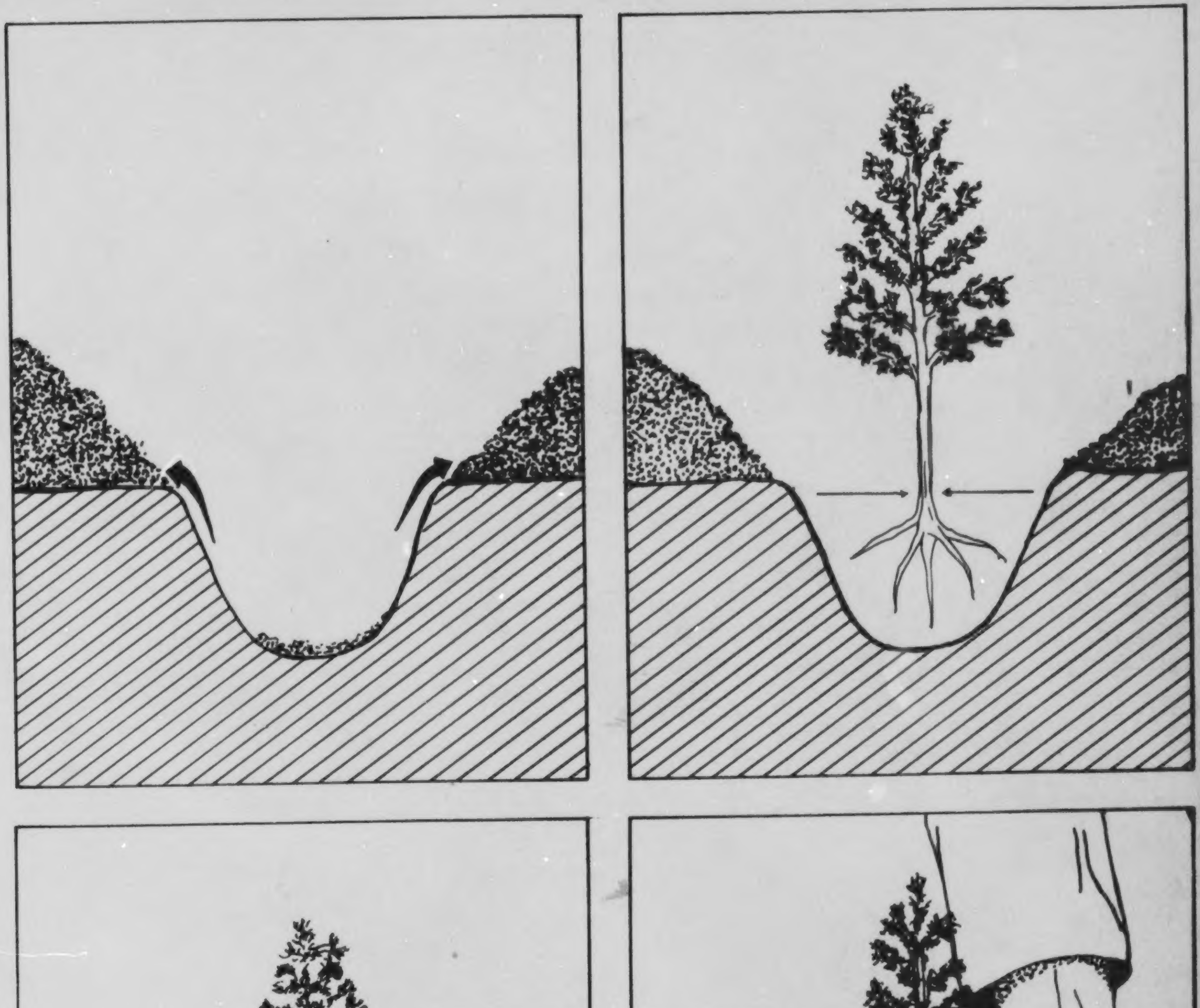
Trainer's Note: This series of drawings can be xeroxed and made into a booklet that trainees can follow along with trainer during lecture.



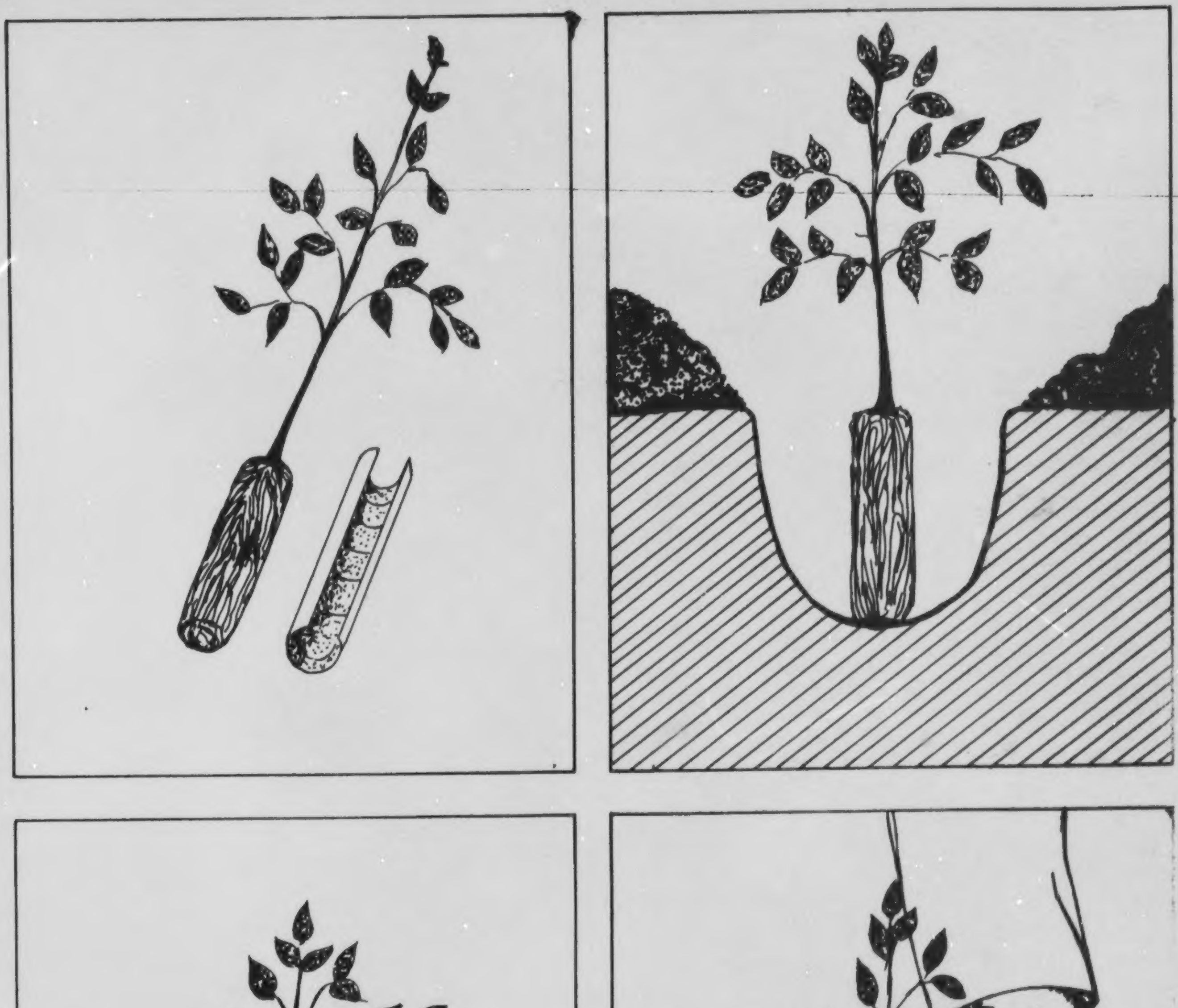
(Fig. 6)



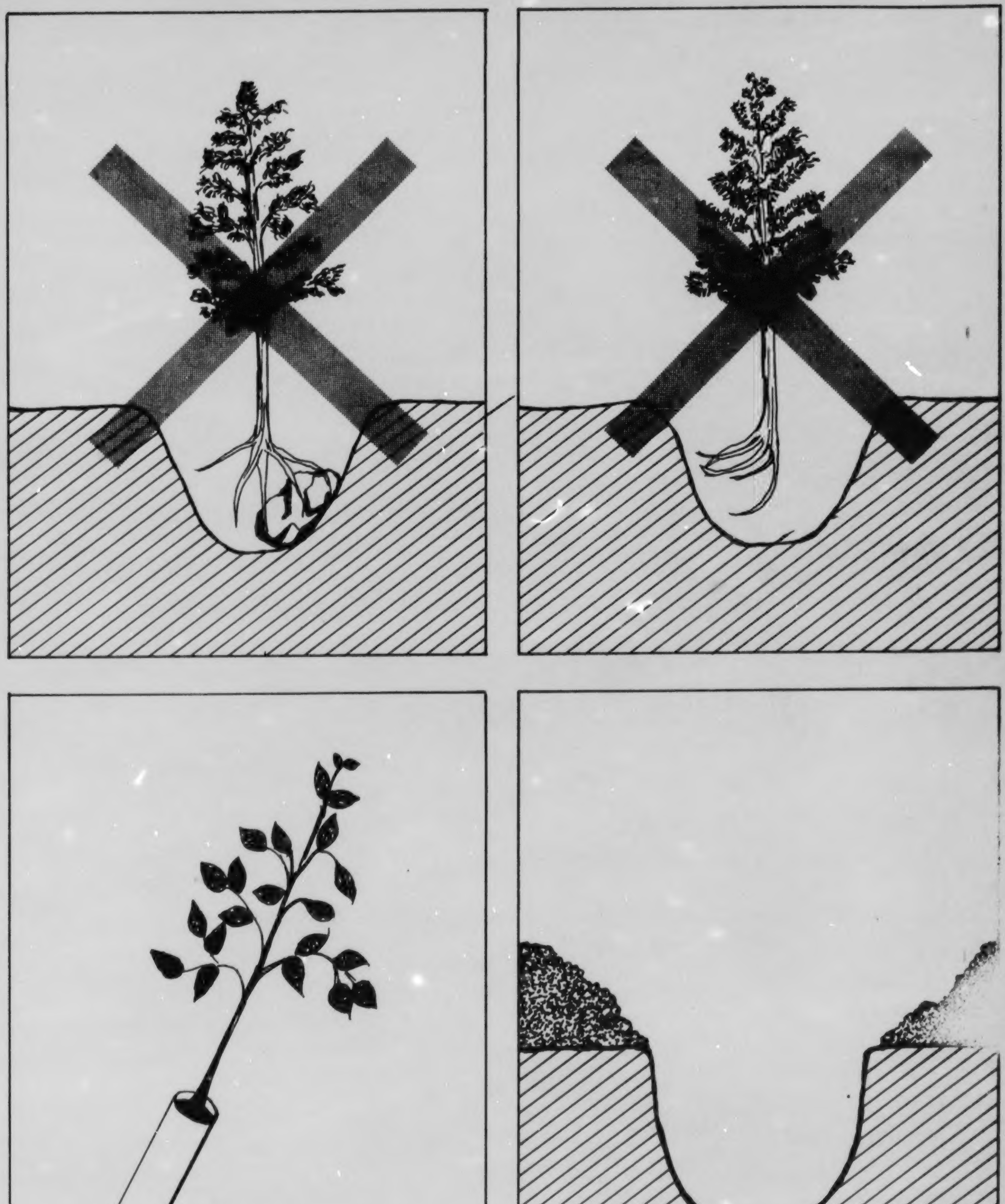
(Fig. 7)



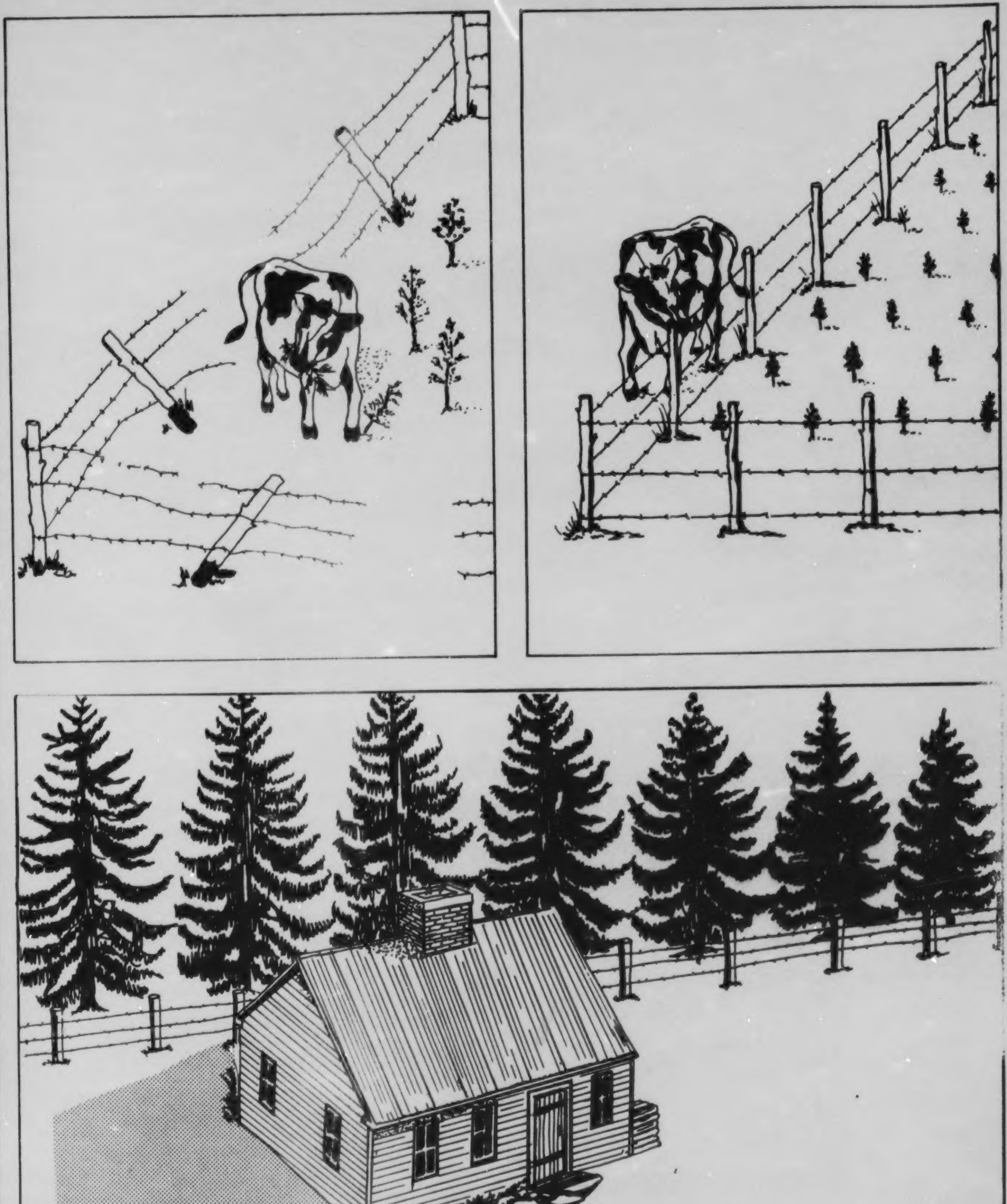
(Fig. 8)



(Fig. 9)



(Fig. 10)



(Fig. 11)

Planting Trees

Total Time

Goals:

- To present an entire lecture in Spanish using illustrations.
- For trainees to plant trees.
- To help others plant trees.

Overview

The technical trainer presents a lecture on the methods of planting trees in Spanish. The trainees will get a preview of the kinds of charlas they will be giving. Trainees will also plant trees and help others plant trees.

Exercise

1. Charla: "Como Plantar"
2. Tree planting

Materials:

- Flip charts, marker pens, tape, shovels, seedlings, (ready for outplanting).

Spanish Language Session

Total Time: 1½ hours

Goals:

To learn vocabulary associated with the planting of trees.

Overview

During this session trainees will practice using words associated with the planting of trees. They should be able to prepare charla for their own use from this vocabulary.

Procedures

Time	Activities
1½ hours	1. Prepare charla of tree planting.
	2. Sentence construction.
	3. Practice in grammar.
	4. Vocabulary.

1. Seedling - plantula; planta de semillero
2. Wet down - mojar bien
3. Heel in - poner en una trinchera pequeña y tapar con tierra; barbechar
4. Roots - raices
5. Root collar - cuello de raiz; corona de raiz
6. Spacing - espacimiento
7. "J" root - raices en forma de jota; raices doblados
8. Air pocket - bolsa de aire
9. Tamp - appretar la tierra
11. Fence post - estaca, poste
13. Barbed wire - alambre de pua
14. Leña - firewood

Introduction to Extension

Total Time: 2 hours

Goals:

- To introduce extension work.
- To give historical overview.
- To look at specific goals of extension.
- To begin the process of developing an extension agent.

Overview

Each trainee regardless of their job assignment will eventually become involved in forestry extension work. This session begins by giving the historical overview of extension work in North America; then goes into "Six Axioms of Forestry Extension."

Exercises

1. Historical overview and some techniques used in the past. Lecture.
2. Six Axioms for forestry extension; small group discussions.

Materials Flip charts, marker pens, tape.

Exercise II Six Axioms of Forestry Extension

Total Time 1 hour 10 minutes

Overview

In this exercise participants become familiar with the basic rules of extension work. Since extension work is such an unstructured activity, the extension worker will find that there are long periods of time when he/she feels as if he/she is not doing anything and is tempted to do more; he/she may also wonder, from time to time, if what he/she is doing is actually advancing or retarding extension work in the community. In extension work the temperament and sensitivity of the worker influence to a large degree how effective the work will be.

Procedures

Time — Activities

1. The trainer posts on newsprint the following axioms and speaks about each one.

30 minutes

- The forestry extensionist should never do anything for people that they are able to do for themselves.
- The forestry extensionist should never encourage the use of resources from outside the community until all the resources within the community have been exhausted.
- The forestry extensionist should never try to organize people to deal with a need they don't themselves recognize (may have to educate first).
- The forestry extensionist's most important dedication must be to the sound local progress of his/her community.
- Forestry extension must be carried out from an understanding of the host culture and in terms of that culture.
- The forestry extensionist role in his/her community is transitory.

It is tempting to add a seventh axiom, which says that the above six should not be taken too seriously. If there is one single encompassing rule in extension work, it is that given the basic goals, the means ultimately are flexible ---- subject to variations according to specific conditions. The extensionist should understand the axioms of an extension worker well enough to follow them when possible and break them, if necessary.

2. Trainer now asks participants to break into groups of five and discuss ways in which they can be successful extension workers. Ideas are recorded on newsprint and presented to the entire group. The following are some examples that came out of our groups.

20 minutes-small group

3 minutes-large group

Ways to Be Successful Extension Workers

We are not alone
communication -contacts
know when to compromise
positive attitudes
diplomacy
know where to start
cultural sensitivity
technical competence
be objective
be aware of problems
don't push own ideas
keep it simple
be a Mr. Tree
work with counterpart
be a resource
be a good example
get along with officials
impart knowledge
follow up on what you do
do not spread yourself too thin
follow the six points of extension
be aware of external and internal resources
transfer a system
work with people
have a good reputation
help others make decisions; do not do it for them
build extension bridges
action speaks louder than words
maintain a sense of humor
quality vs. quantity (do a few things well)
be aware of group dynamics

3. Trainer now does summary of session: Emphasizing that trainees are becoming members of a historical tradition - extension.

5 minutes

Exercise I

Historical Overview and Some Techniques Used in the Past

Total Time: 40 minutes

Overview

During the introduction to extension it is important for trainees to understand that the extension movement has 100 years of history. Though it may be a new concept in developing countries it comes as a tried and true system for helping farmers. Experiences are shared to help trainees get a picture of an extension worker as one who must interact on a one to one basis in order to help a community develop.

Procedures

Time	Activities
	1. Lecture on history of extension outline: o 1862 Morrill Act - Land Grant Colleges o 1887 Research - Experimentation o 1914 Extension o 1940 - 1950 - Good Neighbor Policy of Harry S. Truman, "Partners in Progress."

For extension to be most effective, it must achieve:

General:

1. National concern to improve agrarian structures.
2. Rural population with high level of self esteem.
3. Active participation in significant development programs, i.e., agrarian.

Specific Goals of Extension:

1. Significant objectives - precise, measurable, realistic.
2. Appropriate image.
3. Power - legal, money, political.
4. Institutional mystique.
5. Internal efficiency.
6. Effective communication with public.
7. Coordination with other agencies.
8. Democratic procedures.

2. Be a Mr/Ms Tree. In order for people in a community to know you and why you are in the community you must identify yourself. Any opportunity which arises, you should give away a tree. Some examples are:

    1. birthdays
    2. thank you for any kindness
    3. p.r. for yourself
    4. christenings
    5. just to be friendly

    Trainer asks for suggestions from group at this point.

Trainer's Note: This concept really catches the imagination of the participants. If you know the story of "Johnny Appleseed," it fits in well here. Trainer makes point that in order for people to associate you with trees you must advertise . It is important to remind trainees that any trees given should be personal gifts, never use trees from nursery stock. This is also a good time for trainer to talk about their own experiences as extension agents or community development workers.

The Principals of Pruning and Thinning
Learning How to Make and Use a Diameter Tape

Total Time: 4 hours

Goals:

- To have trainees learn the principals of pruning and thinning.
- To have trainees understand the concept of a diameter tape and its use.

Overview

In this session, participants will come to understand the principals of both pruning and thinning of trees. They will have actual "hands on" practice in pruning trees and thinning a woodlot. Participants will make a diameter tape and learn how to use it. They will measure trees with diameter tapes before thinning.

Exercise

1. Pruning and thinning theory and practice.
2. Make a diameter tape and learn how to use it.

Materials

Flip chart, marker pens, tape, pruning saws, ban saw, standard dressmaker measuring tape (metric), indelible pens.

Exercise I Learning How to Make and Use a Diameter Tape

Total Time: 1 hour

Overview

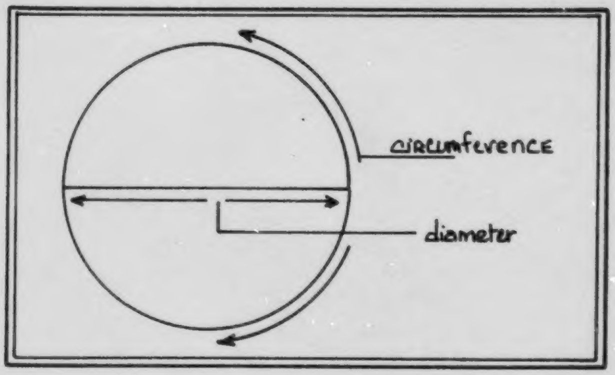
A diameter tape is a simple tool for measuring the diameter of a tree at breast height (DBH). The trainees will first learn how to make a diameter tape. After having made diameter tape, trainees will learn how to measure tree at DBH.

Procedure

Time	Activities
	1. Participant who has taken this on as a special project teaches other trainees how to make diameter tape. It is inexpensive and trainees can teach others how to make and use this tool. The directions should be similar to those listed below. Measurements are also included.

Description

A diameter tape, although it measures the circumference of a tree, is calibrated to read out the diameter measurements. The tree is measured at breast height (DBH); i.e., measure tree diameter at 4½ feet above ground level.



(Fig. 12)

Thus a tree that measures 135.09 cm in circumference has a diameter of 43 cm.

Method:

Using attached scale mark off dress maker tape every 3.14 cm with indelible marking pen. Allow to dry.

Diameter Tape C=πD

1 = 3.14 cm
2 = 6.28
3 = 9.43
4 = 12.57
5 = 15.71
6 = 18.85
7 = 21.99
8 = 25.13
9 = 28.28
10 = 31.42
11 = 34.56
12 = 37.70
13 = 40.84
14 = 43.98
15 = 47.13
16 = 50.27
17 = 53.41
18 = 56.55
19 = 59.69
20 = 62.83
21 = 65.98
22 = 69.12
23 = 72.26
24 = 75.40
25 = 78.54
26 = 81.68
27 = 84.83
28 = 87.97
29 = 91.11
30 = 94.25
31 = 97.39
32 = 100.53
33 = 103.68
34 = 106.82
35 = 109.96
36 = 113.10
37 = 116.24
38 = 119.38
39 = 122.53
40 = 125.67
41 = 128.81
42 = 131.95
43 = 135.09
44 = 138.23
45 = 141.28
46 = 144.52
47 = 147.66
48 = 150.80

DAP Diametro altura de pecho (diameter at breast height [DBH])

Exercise II The Principals of Pruning and Thinning

Total Time: 3 hours

Overview

In this exercise trainees learn the principals of pruning and thinning. Trainees also practice actual pruning and thinning.

Procedure

Time	Activities
45 minutes	1. Technical trainee gives lecture on pruning and thinning with the use of saws and axes. If a trainee has extensive experience in pruning and/or thinning, he is asked by technical trainer to demonstrate proper techniques to other trainees. If no trainee has this specific experience, technical trainer does demonstration.
1 hour	2. Technical trainer now takes trainees to nearby stand of trees in need of pruning and trainees prune trees.
1 hour	3. Trainees also thin a few trees from a stand that needs thinning.
15 minutes	4. Technical trainer supervises trainees and summerizes at end of exercise.

Explanation of these activities is outlined on the following pages:

Materials: Bow saws, axes, diameter tapes (made in previous exercise).

PRUNING (Poda)

Objectives of Pruning:

1. to produce knot free wood,
2. to allow easy access to the forest,
3. to decrease fire hazards,
4. to increase value of stand,
5. to improve the aesthetics of the forest.

Products - Firewood

Advantages:

1. make clear wood production,
2. less taper in tree,

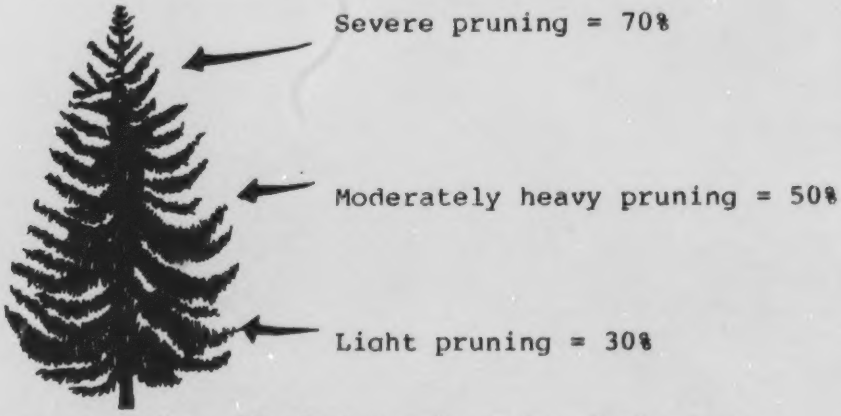
Disadvantages:

1. growth rate decrease.

Methods

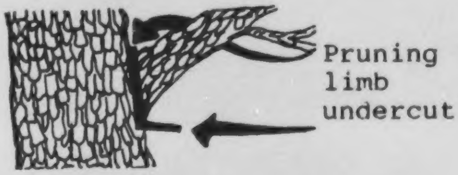
1. It is best to use a pruning saw attached to a pole if higher limbs are to be cut.
2. Use an ax or a machete (on lower limbs) only if worker is really proficient in the use of these tools. Limbs must be cut flush with stem of tree which requires great skill with a machete or an ax.

Pruning - percent of crown to be removed


Severe pruning = 70%
Moderately heavy pruning = 50%
Light pruning = 30%

(Fig. 13)

Pruning - cut should be flushed to the bole of the tree.


Pruning
limb
undercut

(Fig. 14)

Undercut - to avoid stripping bark off tree trunk.

POSSIBLE PRUNING SCHEDULE

Schedule depends on:

1. species
2. growth rate (site)

Example

1st pruning	age 6 - 7 years
2nd pruning	age 8 - 9 years
3rd pruning	age 10 - 12 years

Economic considerations:

1. For what products are the trees being grown?
2. Are prices for pruned trees (or logs or lumber from pruned trees) higher than for unpruned trees?

THINNING

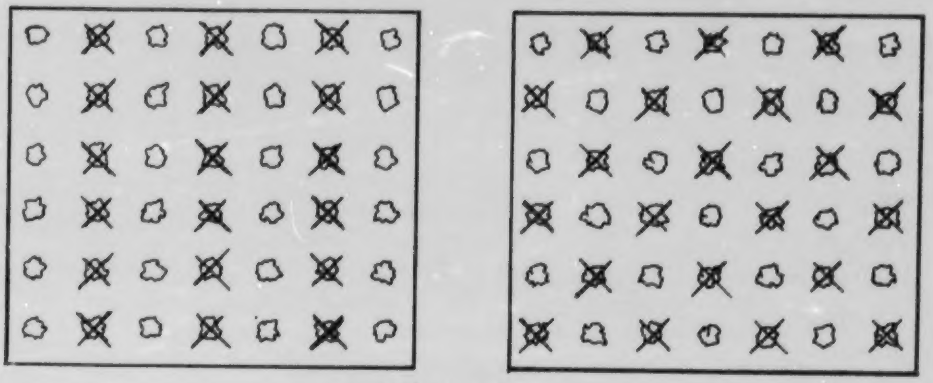
Objectives:

To provide growing space to selected trees (crop trees) so that these trees have the highest annual growth increment possible.

Products:

1. firewood
2. pulpwood (or wood for chips)
3. posts
4. poles
5. rafters
6. small saw logs

Methods - mechanical (systematic)



1. row removal

2. removing every other tree

(Fig. 15)

- Either system removes ½ the trees.
- Both systems can easily be used on young trees.
- Easy to implement and supervise.

Marking for Thinning

Depending on local custom either "leave" or "take" trees are marked. Trees are usually marked at eye level and on stump (all marks facing the same direction).

a. Ax markings are easy, but they can easily be changed.

b. Paint is better but more expensive.

- There should be very close supervision of cutting and removal work.

- Loggers tend to want to remove as much volume as possible.

D + X Method

The average diameter in inches + some factor (X=1 to 8) is equal to the average spacing as expressed in feet.

Example:

Average DBH=12"

factor=6
12+6 =18

Average spacing should be 18 feet between trees.

A good marking method should consider:

1. crown growing space,
2. position of tree in stand structure,
3. defects: rot, top breakage, forks, crook, etc.,
4. root space,
5. openings in stand.

It is best to leave dominants and codominants with room to expand their crowns; remove intermediates, supressed and defective trees. If a systematic thinning was planned with two thinnings per rotation, the results might be the following: (consider a plantation originally planted 2 meters by 2 meters; 2500 trees/hectare).

- Removing every other row would leave 1250 trees/hectare spacing 2 meters by 4 meters.

- Removing ½ the remaining trees would leave 625 trees/hectare with spacing of 4m X 4m.

- It is generally thought that there will be between 600 - 700 crop trees per hectare at the final harvest, however this depends greatly on the species used.

Economics of Thinning

Costs:

marking
falling & bucking
yarding & loading
transport
administration

Total Costs

Price of Materials

price of material

Total Cost
Profit

- The largest cost will probably be transport. The closer to market, the better.
- Keep yarding costs down by keeping maximum yarding distance as small as possible (±200 meters to loading site).
- If labor is cheap, hand falling and bucking might be less costly, although slower.
- If machinery is expensive, using animals for yarding will probably be less costly, although slower.

SESSION XXIV

Spanish Language

Total Time: 1½ hours

Overview

In this session, trainees will use vocabulary words that pertain to pruning, thinning and measuring trees. Trainees will develop sentences around the need related to pruning and thinning. In this session the charla is introduced and participants try making a simple charla on thinning or pruning that could be given in the field.

Procedures

Time	Activities
1½ hours	1. Sentence structuring.
	2. Vocabulary practice.
	3. Making up a simple charla using vocabulary words and instructions from Session 23.

Vocabulary

Shovel - pala
Bucket - balde
Hoe - azadón
Pruning - poda
To prune - podar
Thinning - raleo
To thin - rolear
Stand (tbr) - rodal
Sample - muestra
Test - ensajo
Plot - parcela
Crown - copa
Ax - (el) hacha

Knot - nudo
Stump - cepa, tocón
Wedge - cuna
Height - altura
To cut - cortar
Snag - polo seco
Forest - bosque
Branch - rama
To fall (tbr) - tumbar
Log - trozos
Diameter - diametro
To buck (into logs) - trozar
Test plot - parcela de ensajo

Every other tree - árbol por medio; pasando un árbol
Every other day - día por medio, pasando un día.
DBH - (DAP), diametro altura de pecho
Windbreak - cortina rumpeviento; cortina cortaviento
Windthrow - arboles caldos par effecto de viento.
Power Sow - motosierra

Volunteer's Role as an Extensionist

Total Time: 2½ hours

Goals:

- Examination of the roles of an extensionist.
- Exploration of ways in which to introduce innovations to communities.
- Practice in communicating with community people regarding an innovation.
- To examine communication skills, verbal and non-verbal once more.

Overview

In this session, seven roles are isolated in the process by which a volunteer in the role of an extensionist introduces the concept of tree planting to his/her community. The area of communication is brought up again and skills that volunteers need are focused on. The non-verbal observation assignment from the previous week is discussed and trainees share with their partner their observations over the past week.

Exercise I:
1. Extensionist roles.
2. Communication skills - verbal and non-verbal, of an extensionist.

Materials

Flip charts, marker pens, tape.

SESSION XXV

Exercise I: Extensionist Roles

Total Time: 1 hour 20 minutes

Overview

In this exercise we look at the seven roles of an extension worker. Trainees discuss ways in which they can adopt these roles as volunteers doing extension work in their communities.

Procedures

Time — Activities

1. Trainer introduces the following seven roles and gives an explanation of each:
   - 1.1 Develops need for change.
   - 1.2 Establishes a change relationship.
   - 1.3 Diagnoses the problem.
   - 1.4 Creates intent to change in community members.
   - 1.5 Translates intent into action.
   - 1.6 Stabilizes change and prevents discontinuances.
   - 1.7 Achieves a terminal relationship.

Notes: For trainer's discussion use local examples to illustrate each role.

1.1 Develops need for change - A volunteer is often initially required to help his/her community become aware of the need to alter their behavior. The behavior in this case is either planting trees, or the preservation of trees. This is especially true among campesinos whose potentials have not been realized and workers resist change. The unwillingness to accept change readily and other institutionalized behavioral patterns often result in the volunteer serving as a catalyst in the community. In order to do forestry extension work the volunteer points out new alternatives to existing forestry problems, dramatizes these problems and convinces campesinos that they are capable of confronting forestry problems. The volunteer acting as an extension worker not only assesses the community at this stage but also helps to create these needs in a consultative and persuasive manner.

1.2 Establish a change relationship - Once the need for change is created, the volunteer must develop rapport with the community. He/she enhances his/her relationship with the community by creating an impression of credibility, trustworthiness, and empathy toward their needs and problems. Communities must trust the volunteer worker before they will accept the innovations he/she proposes.

1.3 Diagnosis of the problem - The extension worker is responsible for analyzing his community's problems/situation in order to determine why existing alternatives do not meet the community's needs. In arriving at his/her diagnostic conclusions, the extension worker must view the situation empathetically from the community's point of view and not his/her own. The volunteer extension worker must psychologically place themselves in their situations, put him/herself in their shoes, see their lives through their eyes. This empathy transferral is difficult.

1.4 Creates intent to change in community members - After the volunteer explores various avenues of action that his/her community might take to achieve their goals, he should encourage an intent to change, a motive to innovate. But the change must be community-centered, rather than for change for the sake of change. Here the volunteer's role is to motivate.

1.5 Translates intent into action - The volunteer now seeks to influence his/her community's behavior in accordance with his recommendations which are based on the community's needs. In essence, the volunteer works to promote compliance with the program he/she advocates.

This means more than simple agreement on intent. It means action or behavioral change.

1.6 Stabilizes change and prevents discontinuances - Volunteers may effectively stabilize new behavior by directly reinforcing messages to those community members who have adapted, thus "freezing" the new behavior. This assistance frequently is given when the campesino is at the trial-decision or confirmation function in the innovation-decision process.

1.7 Achieves a terminal relationship - The end goal for the volunteer extension worker is development of self-renewing behavior on the part of his/her community. The volunteer should seek to put him/herself out of business by developing his/her community's ability to be their own change agent. In other words, the volunteer must seek to shift the community from a position of reliance on the volunteer to self-reliance.

(The above 7 roles have been adapted from: Communication of Innovations by Rogers & Shoemaker)

2. Trainer now asks group to form into small groups and envision the seven roles of an extension worker as objectives they have set for themselves and then come up with action steps to achieve these objectives. Make a list of these steps on newsprint. 40 minutes

3. Small groups now share with large group their action steps. 15 minutes or 20 minutes

4. Trainer now does a summary of the presentations and introduces the next exercise.

SESSION XXV

Exercise II: Communication Skills - Verbal and Non-verbal, of an Extensionist.

Total Time: 1 hour 15 minutes

Overview

In the preceeding exercise we have looked closely at the seven roles that an extension worker plays. Now we want to look at the kind of communication skills a volunteer will need to carry out extension work. In this exercise, we also process the session of the previous week by discussing, generalizing and applying the experience accumulated by the trainees in one week of observing non-verbal behavior with each other. Then the participants give each other feedback on what they saw each other doing, discuss observations and arrive at some working assumptions/generalizations about how non-verbal communications may be the most important part of their communications system in the early days of their volunteer work.

Procedures

Time	Activities
5 minutes	1. Trainer asks participants to list various kinds of communication skills they are going to need to carry out their role as extension workers.
5 minutes	2. Trainer now asks participants to call out skills and lists them on newsprint while they are called out.
3 minutes	3. Trainer makes general comments about skills trainees have not identified. If non-verbal skills have not been listed, trainer adds and makes the point that in the early days of volunteer service participants will send out many non-verbal messages that will be his/her first impact on communities.
10 minutes	4. Ask the group to form into the same pairs that have been observing each other for the past week and spend a few minutes telling each other what they observed each other doing in terms of non-verbal communication during that time. This should serve as a way for individuals to gain insights into how they use non-verbal processes in ways which they may not be aware of.

5 minutes

5. Bring group back together and draw out some generalizations from the experience of observing each.

6. Ask each pair to get with another pair and discuss the following questions. Discussion questions should be posted on flip chart.

   - Did any of you learn anything new about yourselves? What?

   - Is there anything about non-verbal communications in general that you have learned from the experience?

   - Have you any ideas on how you can use non-verbal communication as an extension worker? What are they?

15 minutes

7. Trainer now asks for comments from participants on communication skills. He then summarizes the verbal and non-verbal skills that an extension worker needs.

SESSION XXVI

Pacing, Plane Table, Rustic Transit and Compass

Total Time: 4½ hours

Goals:

- Learn how to use a plane table.
- Learn how to use rustic level.
- Learn how to pace.
- Learn how to use a compass.
- Learn how to make a simple traverse.
- Learn simple method for calculating area.

Overview

In this session trainees learn several forestry techniques. Trainees will demonstrate special projects they have completed; i.e., plane table and rustic transit. Participants learn how to pace, how to make a simple traverse and how to calcuate area.

Exercises:

1. plane table
2. rustic level
3. pacing
4. compass use
5. simple traverse
6. simple calculation

Materials:

1. Plane table (made by trainee),
2. Rustic transit level (made by trainee),
3. Compass (you will want to ask anyone who has a compass to bring it to the session),
4. Two (2) meter long sticks for trainees,
5. Bright colored flagging (surveyor's plastic flagging),
6. graph paper.

Exercise I

Plane Table Survey

Total Time: one half hour

Overview

Quite often, Peace Corps volunteers are called upon to assist in or draw a map of an area. Sometimes sophisticated surveying equipment is not available or the volunteer does not understand how to use it. One solution to this problem is the plane table survey. This is a simple method of mapping an area utilizing a plane table, graph paper, common pins and a rubber band. On day one a participant undertook this project for demonstration. Here in this exercise the plane table method is demonstrated and participants learn its use.

Procedures

Time	Activities
	1. Trainee introduces his special project to group. Demonstrates its use. (Sample follows)
	2. Trainees will later in this session practice using plane table.

M. Oliveira

PLANE TABLE SURVEYING

Quite often, Peace Corps volunteers are called upon to assist or draw up a map of a certain area. Sometimes, sophisticated surveying equipment is either not available or the volunteer does not understand how to use it.

As a solution to this problem a plane survey table (fig.16) can be used. This is a simple method of mapping an area utilizing a plane table, graph paper, common pins and a rubber band.

The paper is laid on the table. Next the table is placed on one of the corners of the area to be surveyed. After leveling the table (you can use a small inexpensive carpenter's level), stick a pin in the paper in the corner corresponding to the corner of the traverse where you are (i.e., SW corner of traverse corresponds to the bottom left of your paper).

Next take another pin and using the first pin as the backsight, line the second pin up with the next corner of the traverse. To determine the distance, you can either pace the distance or use a measuring tape. Using a scale (1cm = 10m) draw the line between the pins and you have your first leg of the traverse. (fig. 18)

Next go to the corner which you just measured and set up the plane table there (do not forget to level the table). Line up both pins so that the line of sight through these pins is the line you just measured. Then turn and using the pin for the point where you are as the backsight, line up another pin to the point to the next corner (turning point). You would repeat this process at every corner of your survey until you've completed the traverse.

Any buildings or other points within the traverse could be included by "shooting" a line to each corner of the building using the method described above.

With this process you actually draw the map as you go along and you need not rely on a compass for your work.

Once you have the map completed, you can determine the area in one of two ways. First, if you used graph paper, you could count the blocks to determine the area (if you drew the map to scale you could determine the area in one block of the graph paper).

The second method would be geometrically (fig. 19). You break the figure down to simple figures such as rectangles and right triangles and then determine the areas for each using the formulas: Area of a rectangle = length X width
Area of a right triangle = ½base X height

Plane Table Surveying

The advantages of a plane table are:

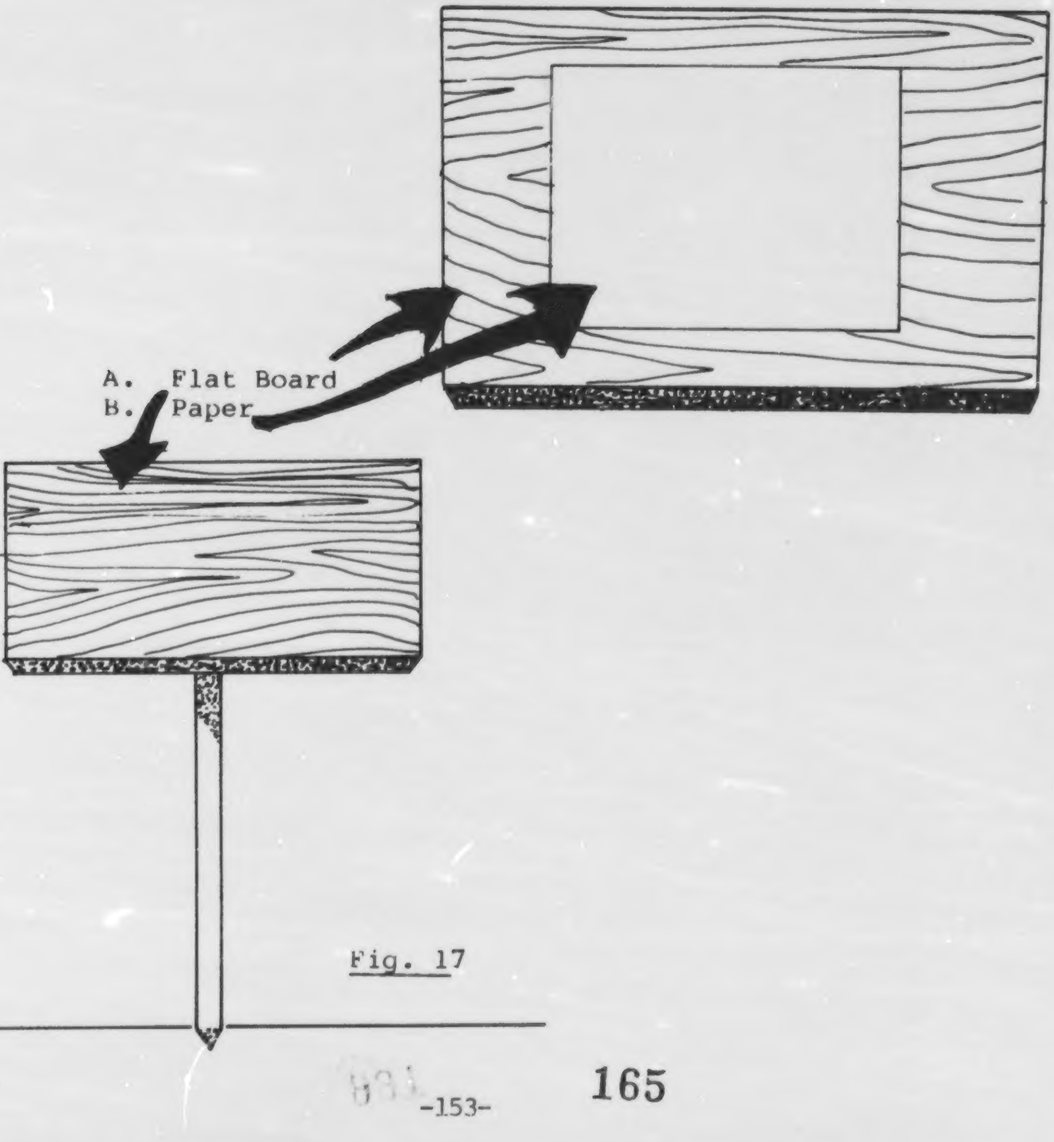
1. Easy to build
2. Easy to use
3. A cheap system to determine area

The possible disadvantages could be:

1. Could be heavy and cumbersome
2. Wouldn't be as accurate as a transit
3. Weather could play a determining role (i.e., rain)

With the materials available virtually throughout all the developing nations of the world and the cost so low, there is no reason why with some practice, we could not be able to map an area of land if called upon to do so.

PLANE SURVEYING TABLE



(Fig. 1

Fig. 17

PLANE SURVEYING TABLE

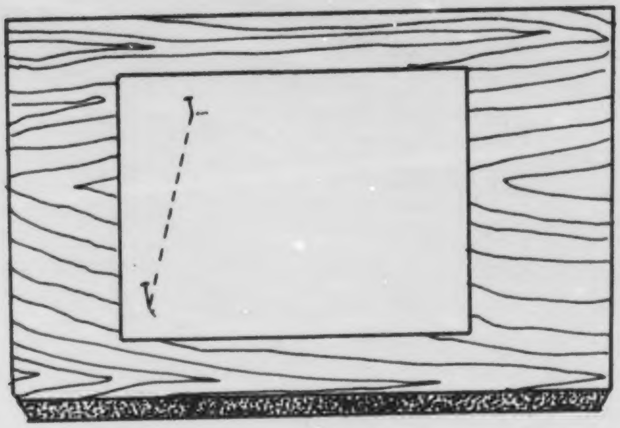


Fig. 18

1. Pins
2. Line of Sight
   (leg of traverse)

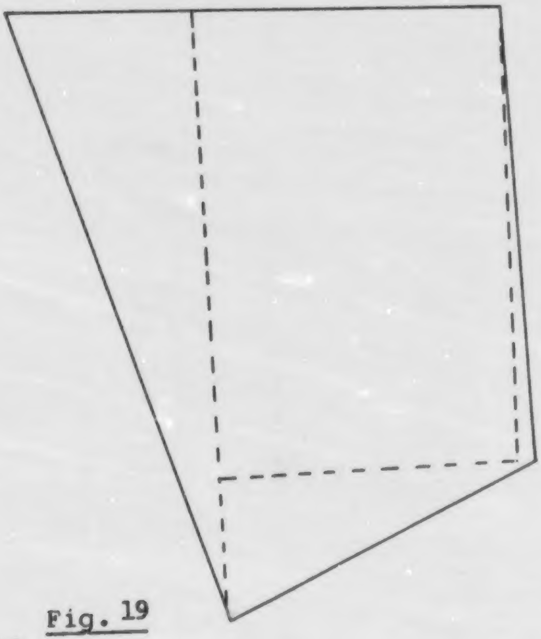


Fig. 19

Area of right triangle = ½bh
Area of rectangle = l X w

SESSION XXVI

Exercise II

Rustic Level (Ceuvas de nivel)

Total Time: one half nour

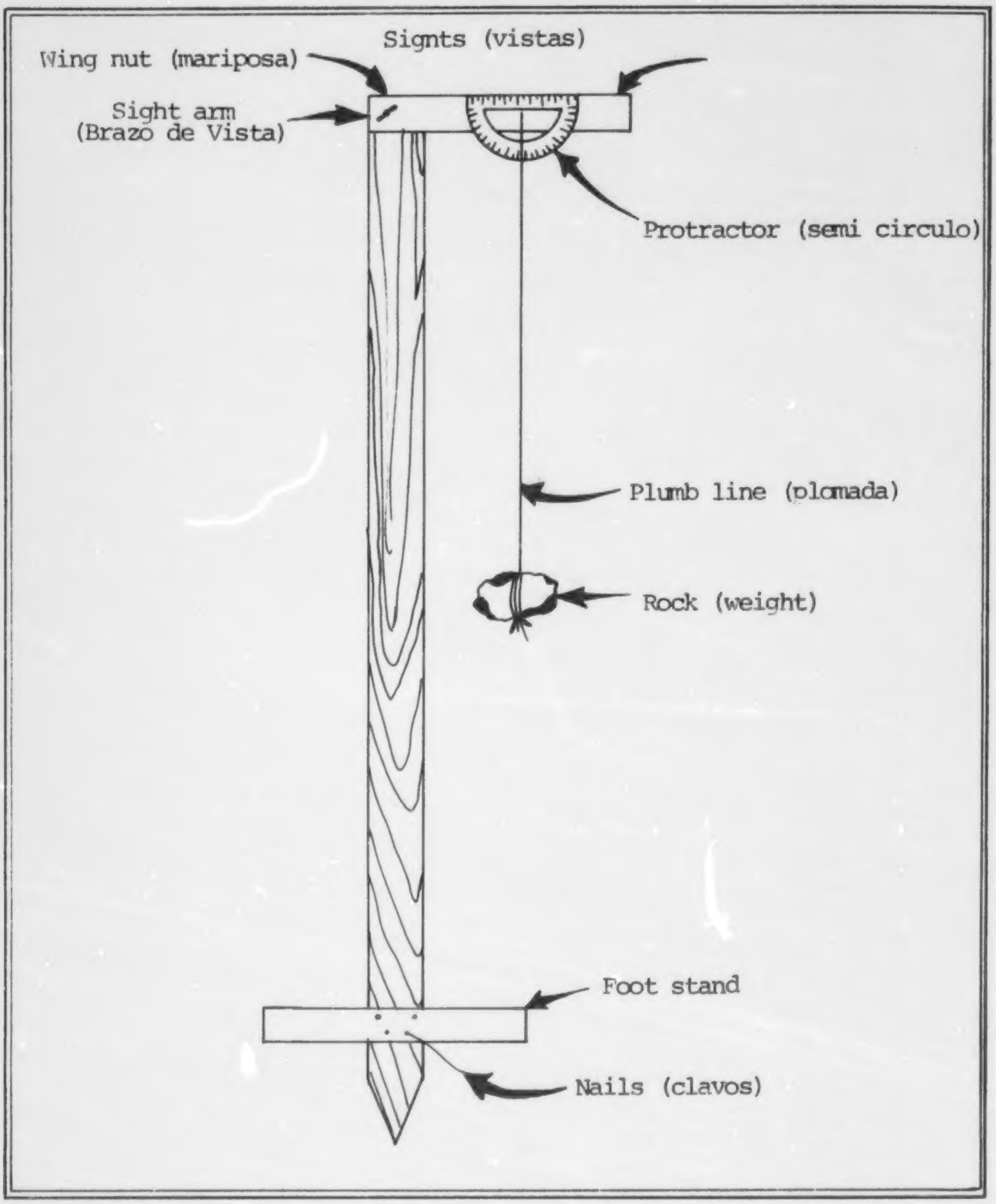
Overview

Planting along the contour is an agricultural practice used in erosion control. Rustic instruments can be constructed easily and cheaply. In this exercise, one such instrument, the rustic level is demonstrated.

Procedures

Time	Activities
	1. Trainee(s) introduces special project to group. Demonstrates its use (sample follows).
½ hour	2. Trainees will later in this session, practice using a rustic level.

RUSTIC LEVEL FOR CURVAS DE NIVEL



Signts (vistas)
Wing nut (mariposa)
Sight arm
(Brazo de Vista)
Protractor (semi circulo)
Plumb line (plomada)
Rock (weight)
Foot stand
Nails (clavos)

Fig. 20

Demonstration on Curvas de Nivel

Here are the materials necessary for construction of this rustic level. Its uses are for designing contour terracing for soil erosion control and other land surveys.

Materials

- Board 4 cm (h) X 3 cm (w) X 2 cm (l)
- Pole 2m long (bamboo is good for this)
- Small piece of wood 2 cm (h) X 4 cm (w) X 40 cm (l)
- 1 wing nut, 6 cm long
- Nails
- 1 protractor
- 1 plumb line
- 1 weight (bowling ball is too big)
- A piece of cloth - marker
- Bottle cap - sight
- Stakes for surveying

CURVAS DE NIVEL

The term "Curvas de nivel" is translated into English to mean contour lines. Plowing along the contour is an agricultural practice to aid in erosion control. By plowing with the contour, soil erosion can be reduced by as much as 50%. "Curvas de nivel" are generally incorporated with other erosion control measures such as strip cropping, crop rotation, agro-forestry, diversion ditches and diversion terracing.

Diversion terraces are a widely used method in South America to catch surface runoff and allow its safe exit from the field. The terraces are constructed along the contour at intervals down the slope. The distance between terraces varies depending on the slope of the land. The terrace is raised to a height of 50 - 70 cm with a width of 1 meter. The up slope side of the terrace has a channel 50cm wide and 30cm deep which catches surface runoff. This channel has a gradual slope of 0.25 - 0.50 percent off one side of the field. The channel should be covered with a low growing grass to reduce erosion in the channel itself. The terraces should be vegetated also with bunch grass, trees or left for natural weed cover to take over.

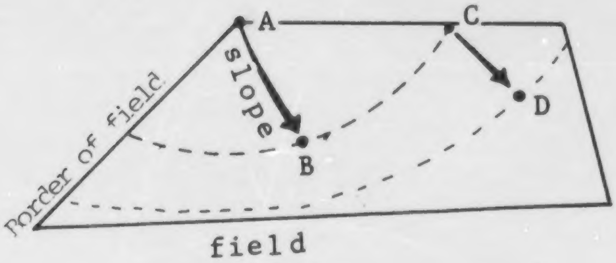
Curvas de nivel can be layed out using rustic or modern instruments. Rustic instruments can be constructed easily and cheaply. Three people are generally needed to lay out the contour lines. Using rustic methods, about 4 - 6 ha/day can be marked as opposed to 15 - 20 ha/day with a tripod surveyers level. These figures vary depending on the uniformity and slope of the land.

Laying out the "Curvas de Nivel

1) The first step is to measure the slope of the field in degrees or percent. The steepness of the slope will determine the distance between terraces. The steeper your slope the closer your terraces, the less your gradient the farther apart the terraces. Slope can be measured using a protractor, abney level or surveyers level. The protractor will give degree slope while the latter will be two percent slope. Tables are available in most areas which indicate terrace spacing in relation to slope and soil type.

2) After determining slope and the terrace spacing the marking can be started. Start from the highest point in the field and measure down the slope of your calculated terrace interval to your first point. It is important to always measure this distance directly down the slope. This direction may not coincide down the border of the field. If this distance is not measured directly down the slope, your terraces will not have uniform distances between them. This may mean starting from the middle of the field (fig.1) from point "A" and measuring down slope towards point "B". Point "B" is the starting point. From here you mark the contour towards the borders of the field.

When you arrive at point "C", you measure to your next terrace to point "D", directly down slope.



(Fig. 21)

Using the rustic instruments, points can be marked every 10 or 15 meters. The points are marked by driving a stake into the ground. Using a surveyor, level points can be placed every 30 - 35 meters. A helpful way to measure these distances is to tie a light weight rope between the sighting instrument and the sight rod.

Once all the contours are marked you will see that some stakes may not be in line. It will be necessary to adjust some points in order to have a smooth plow line. For example a sharp V in the contour will cause water to collect and leak through the terrace. It will also be harder for the farmer to plow his field.

3) The terraces can be constructed with tractor, horse, oxen or hand. The tractor is most efficient because it can throw more soil. When using animals, it is necessary to follow up with hoes to raise the terrace and also deepen the channel in front.

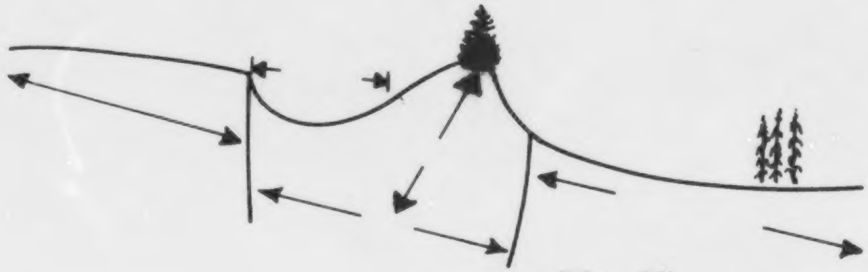
The actual plowing is done by throwing soil toward the stakes on both the uphill and downhill side. With a tractor two passes on each side is usually sufficient. With animals 3 - 4 passes on each side are recommended. With either method the last pass should be on the uphill side to clean out the diversion channel.

4) Vegetation should be established as soon a possible. Bunch grasses can be planted from cuttings or by seed. The grass in the diversion channel can be seeded or left to natural weeds growth. Trees can also be planted on the terraces in conjunction with the bunch grasses.

SOME WAYS TO USE YOUR RUSTIC TRANSIT

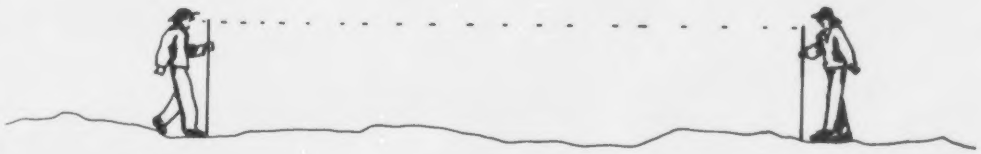
Mostly you will be using this level to aid you in making contour level terraces (curvas de nivel). These are for the protection of soil in crop fields. This method is not recommended for over 13% slope.

Example: This is a Curva de Nivel



(Fig. 22)

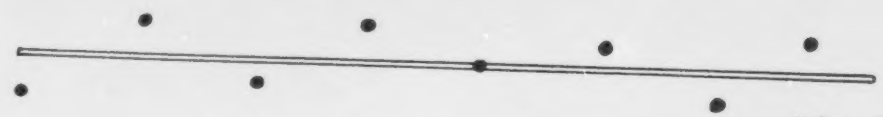
You take your rustic transit (transito rustico) and sight out over your sight arm to the mark on the sight pole (which is 10 meters away in this example).



(Fig. 23)

You have the man move up or down the slope until you see your mark through the sight. Then he puts a stake in that spot, and then its on to the next mark. Fairly soon, you would have stakes all along the contour of the slope for that particular terrace (curvas).

(Fig. 24)



(Fig. 25)

All of these are 10 meters apart.

* You want to make an average line out of these stake markers because it would be too hard to work, and puddles of water would gather in the pockets.

MIRA

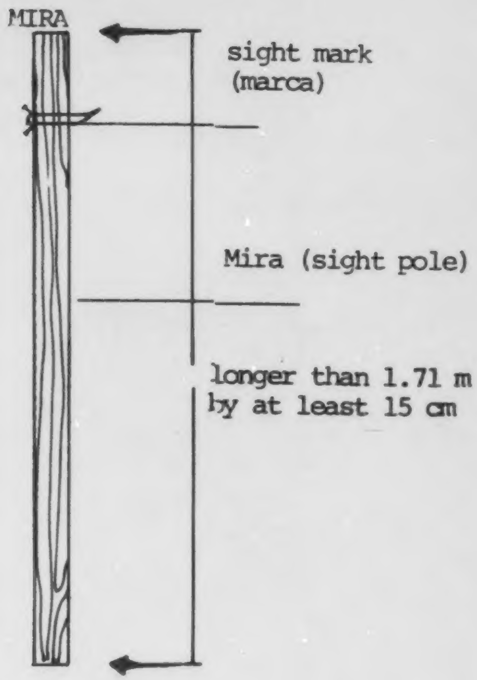

MIRA
sight mark
(marca)
Mira (sight pole)
longer than 1.71 m
by at least 15 cm

Fig. 26

RUSTIC LEVEL (MAQUINA)

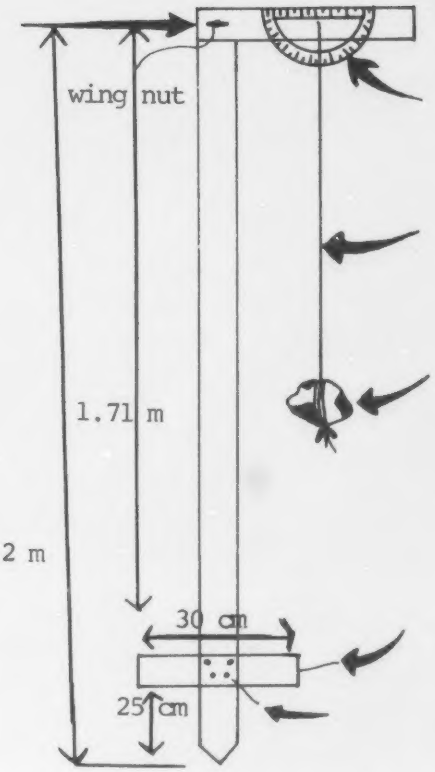

wing nut
1.71 m
2 m
30 cm
25 cm

Fig. 27

Some ways to use you rustic transit

Also you can incorporate a drainage slope in your curvas de nivel. This would be to disperse water caught in the ditch of the curvas de nivel. For example, you decide on .5% slope for drainage. For every 1% slope at 10 meters distance from sight pole to rustic level you move your mark on sight pole up or down (depending which way slope will run). In this case, with .5% slope drainage at 10 meters distance you would move mark up or down 5cm.

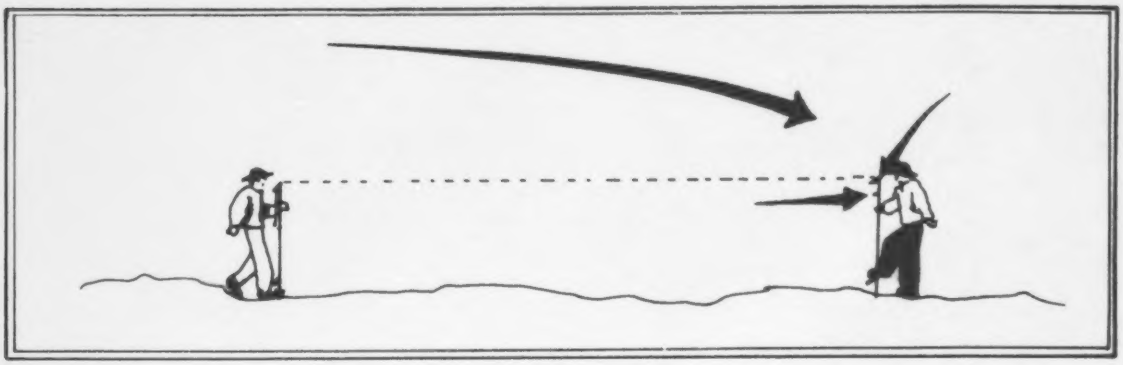


Fig.28

For .5% slope, drain off channel, move sight line 5cm every 10 meters between the two men (up or down depending on which way you want water to run), towards sight man or "maquina" man.

You can control 50% of your erosion, just by running your rows of crops along the contour line which does not need to be long.

The following Peace Corps Volunteers contributed to this exercise: Michelle Myers, Jacob Fillion and Jim Storandt.

Exercise III

Pacing

Total Time: one half hour

Overview

Pacing, if done correctly can be used to get good distance measurements. Technical trainer instructs trainee in method of pacing and how to measure distance by pacing.

Procedures

Time	Activities
15 minutes	1. Technical trainer gives lecture on pacing and gives instructions in the use of a pacing stick (post on newsprint).
15 minutes	2. Trainees figure out their pace and make pacing stick for themselves.

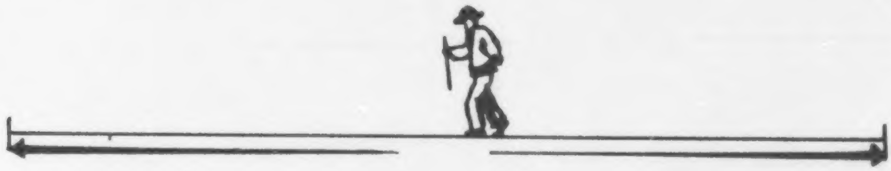
Objectives: To teach trainees how to measure distance by pacing.

Pacing

Pacing if done correctly can be used to get good distance measurements.

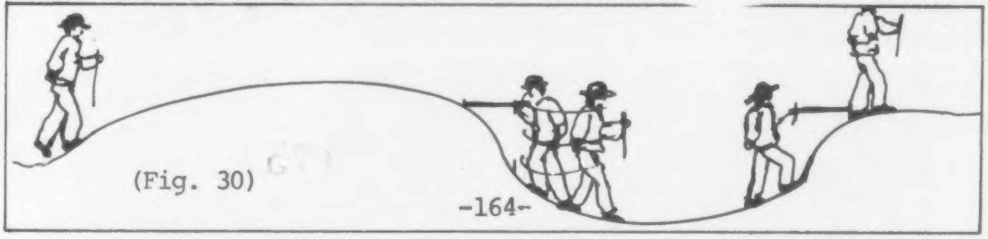
Methods for developing pacing skills:

1. Lay out a base line 20 meters long.
2. Walk naturally along base line to determine how many paces you take for 20 meters (1 pace=2 steps).



(Fig. 29)

3. Cut a stick the length of your pace.
4. On flat ground you can pace naturally keeping track of every 20 meter interval.
5. On slopes you can use your stick to measure your horizontal pace.



(Fig. 30)

Pacing Examples

1. My pace: (2 steps) = 1.6 meters.
   (My stick is 1.6 meters long).

2. My pace for the 20 meter baseline = 12.5 paces.

3. 62.5 paces = 100 meters.

Trainer's Note: Although pacing is not widely used in the U.S., it is desirable for PCVs to know this method for use in developing countries and to be able to teach the same.

4. When actually pacing off an unknown distance, put out a finger, or pick up a stone or stick to keep track of every 20 meter segment. Total distance can easily be calculated in your head.

Example: At the end of an unknown segment I have 3 stones in my hand and 4 paces more.

3 X 20 meters = 60 meters

4 X 1.6 approx equals 4 X 1.5 = 6 meters

Total Distance = 66 meters

Exercise IV

Compass

Total Time: one half hour

Overview

Some of the participants will not have been instructed in the use of the compass. Those who know how to use a compass will assist other trainees in learning its use.

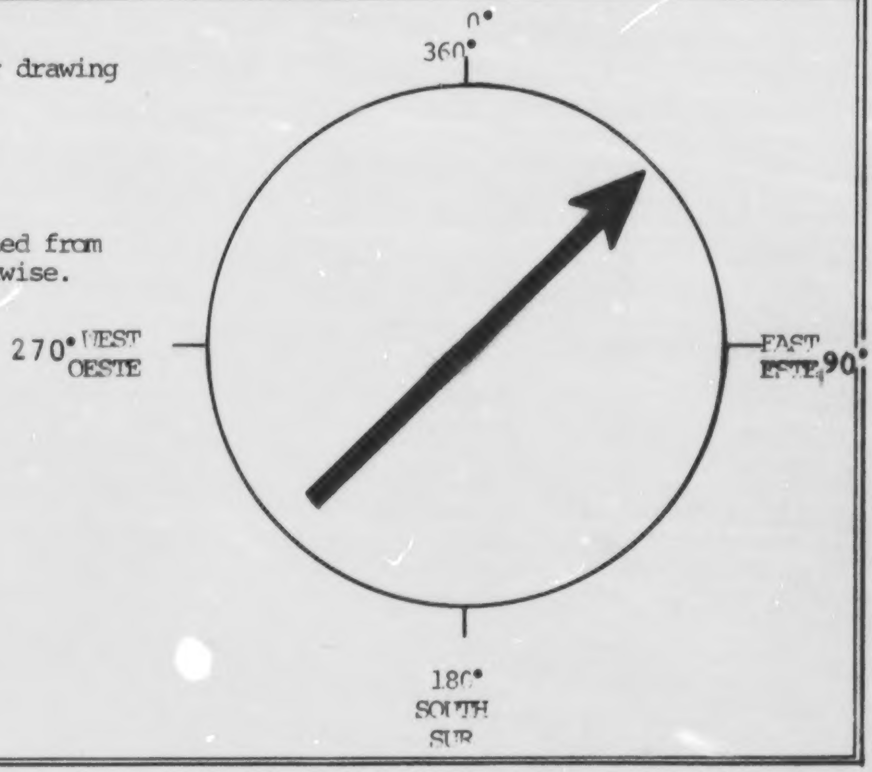
Procedures

Time	Activities
15 minutes	1. Trainer lectures on use of compass. On newsprint, show the Azimuth compass, Quardrant compass and the European compass and their use.
15 minutes	2. Trainees who do not know how to use compasses practice aided by trainee who knows how to use them.

COMPASS (BRUJULA)
(Compass - Instrument for drawing circles.

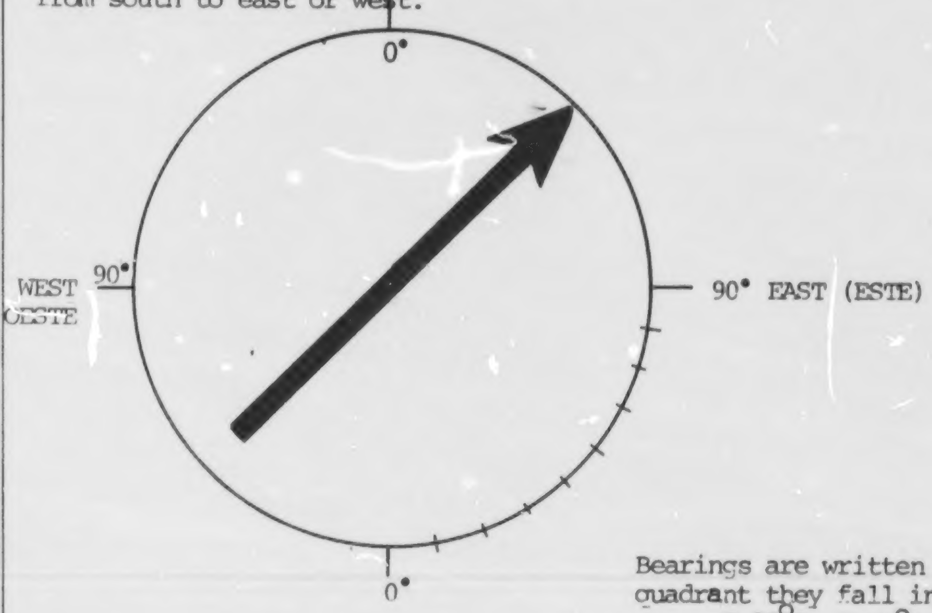
AZIMUTH COMPASS
(AZIMUT)

Compass circle is graduated from 0° to 360°, reading clockwise.


0°
360°
270° WEST
OESTE
EAST
ESTE 90°
180°
SOUTH
SUR

(Fig. 31)

QUADRANT COMPASS - Compass circle broken into four 90° quardrants reading from north to east or west, and from south to east or west.

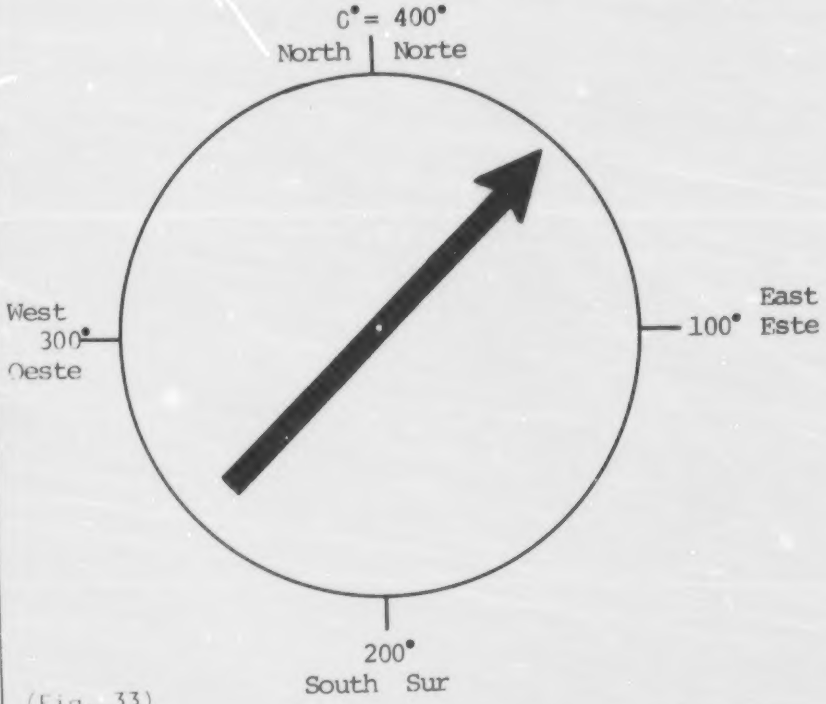

0°
WEST
OESTE
90°
90° EAST (ESTE)
0°

Bearings are written according to which quadrant they fall into:
e.g., S-20°E, N-35°W, N-50°E, S-10°W

DISADVANTAGES: Quadrants can be confused.

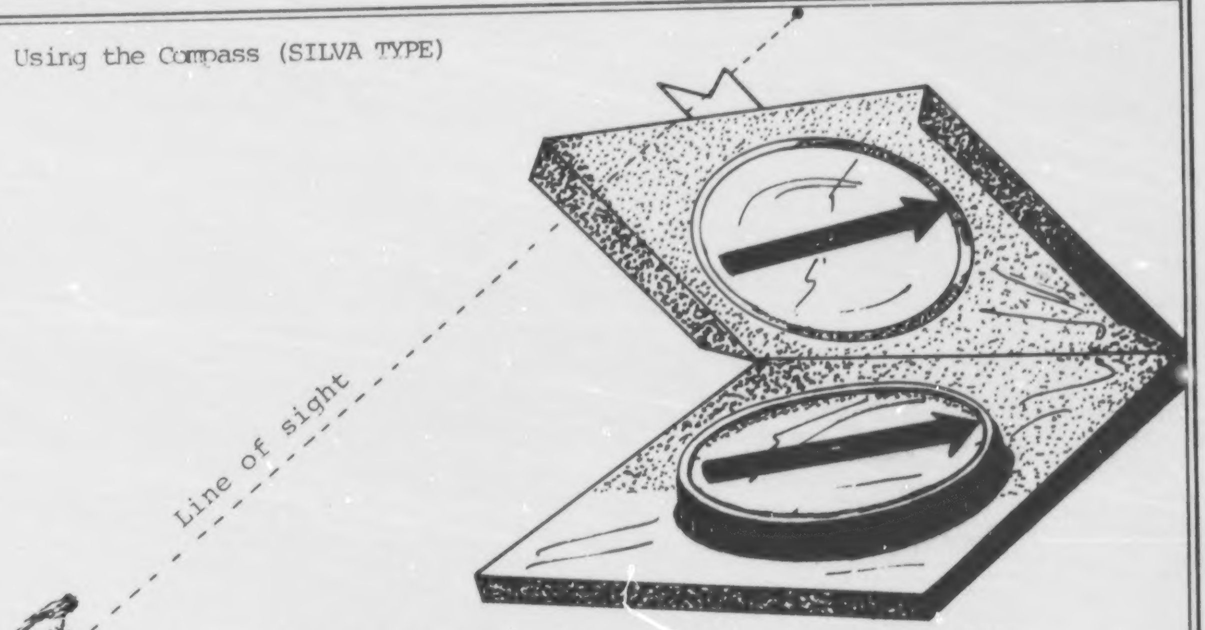
(Fig. 32)

EUROPEAN COMPASS - Circle divided into 400 grads
Special tables are needed for computations


0° = 400°
North
Norte
East
100°
Este
West
300°
Oeste
200°
South
Sur

(Fig. 33)

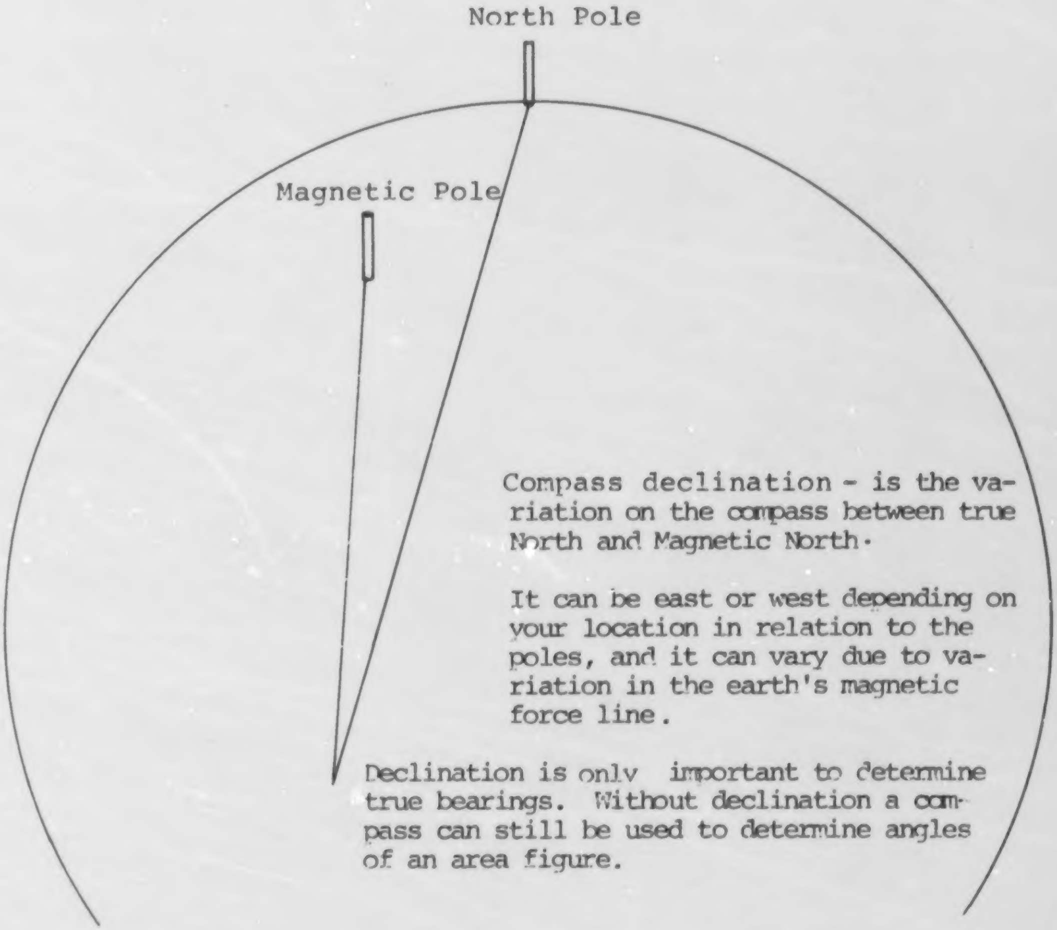
Using the Compass (SILVA TYPE)


Line of sight

1. Be sure to hold compass level so that needle swings free.
2. Sight on stake and turn compass dial until red needle lines up parallel to black arrow.
3. Read bearing on dial.

(Fig. 34)

COMPASS DECLINATION



Compass declination - is the variation on the compass between true North and Magnetic North.

It can be east or west depending on your location in relation to the poles, and it can vary due to variation in the earth's magnetic force line.

Declination is only important to determine true bearings. Without declination a compass can still be used to determine angles of an area figure.

(Fig. 35)

Exercise V

Simple Traverse

Total Time: 1 hour

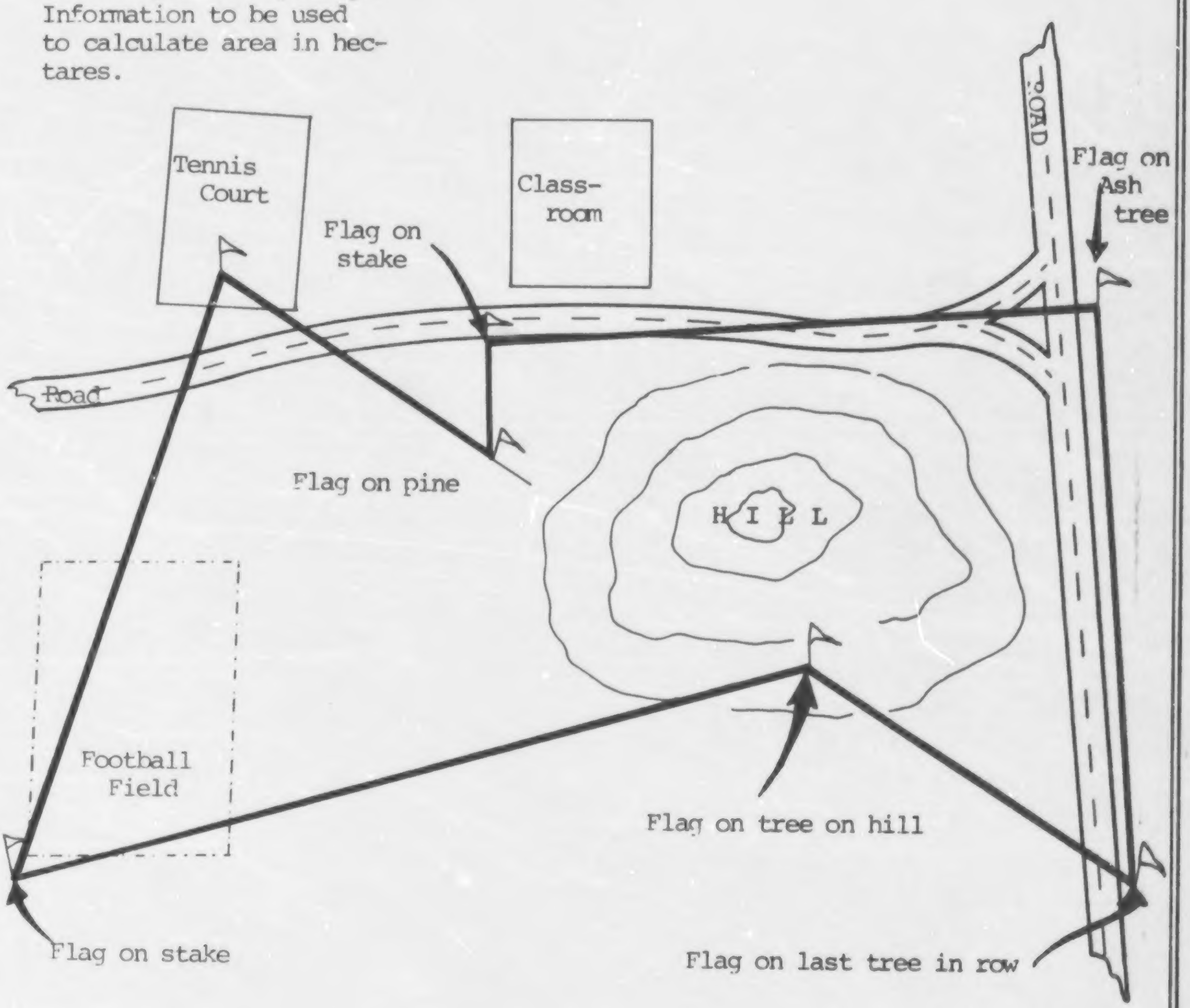
Overview

This exercise gives trainees a chance to use pacing skills and compass to run a simple traverse.

Procedures

Time	Activities
	1. Prior to this session, forester trainer stakes out an area on which trainees practice. Forester trainer uses flags to mark points. The area selected should have some steep slopes.
	2. Trainees are divided into groups with at least one forester trainee in each group.
	3. They go out and run a traverse using hand compass and pacing.
	4. Upon completion of traverse, trainees plot the area on graph paper and calculate the area.

Area to be traversed with hand compass and pacing. Information to be used to calculate area in hectares.


Tennis Court
Class-room
ROAD
Flag on Ash tree
Flag on stake
Road
Flag on pine
HILL
Football Field
Flag on tree on hill
Flag on stake
Flag on last tree in row

(Fig. 36)

Exercise VI Simple Calculations

Total Time: 1 hour

Overview

To teach trainees a simple method of determining approximate land areas is the objective of this exercise.

Procedures

Time	Activities
	1. Forester trainer gives lecture on area calculation and posts the following on newsprint.

1.1 plot out traverse to scale on sheet,

1.2 break down traversed figure into right triangles and/or rectangles,

1.3 calculate each area in right triangle and/or rectangle,

1.4 total all calculations,

1.5 divide by 10,000 to get hectares,

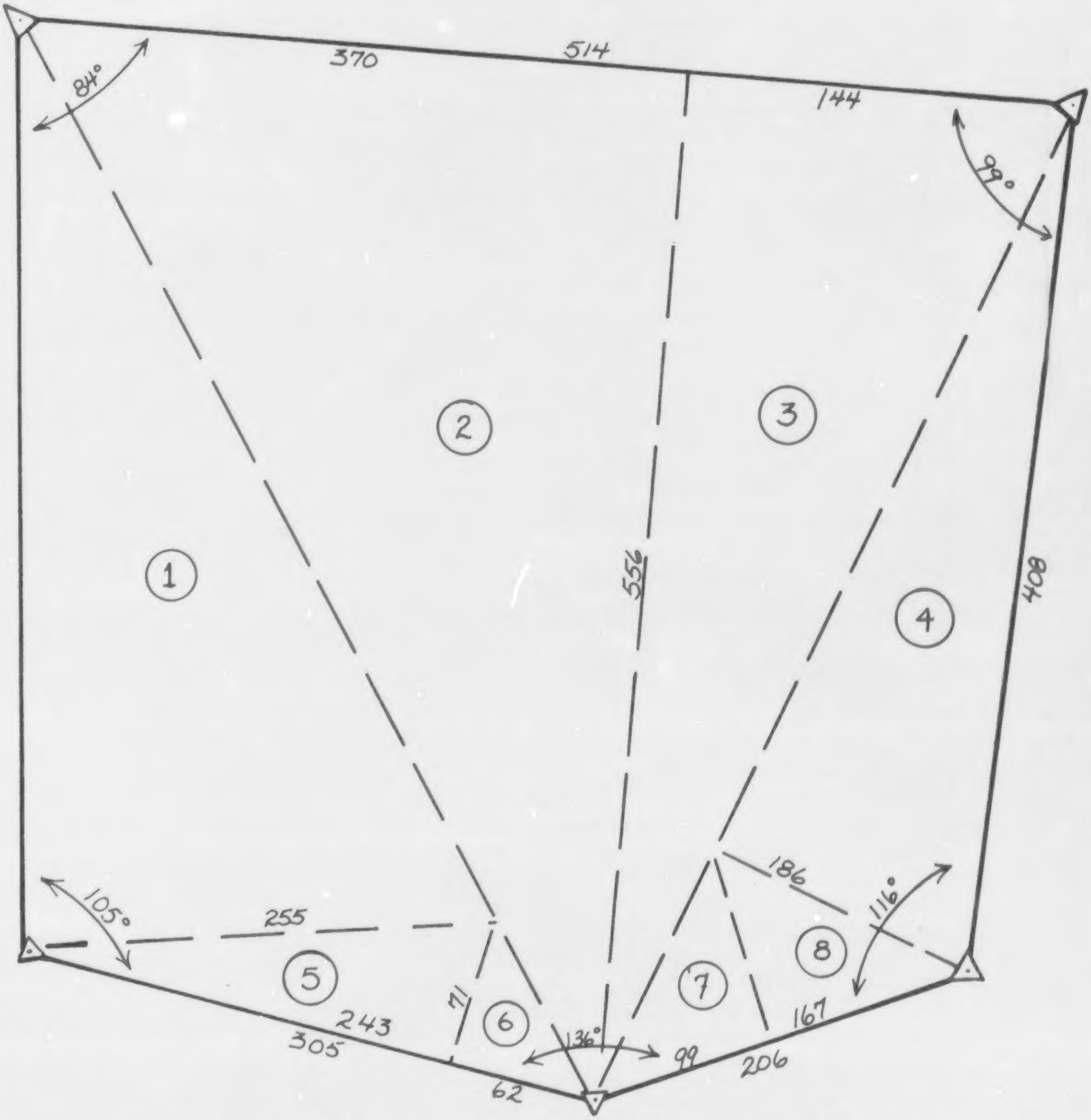
Area Formulas

Area of right triangle = $\frac{1}{2}$(base)(height)
Area of rectangle = (base)(height)

1.6 can check by counting squares on graph paper.

2. Forester trainer continues with lecture on area traverse record keeping. Displays the following example.

EXAMPLE OF CALCULATING AREA BY BREAKING AREA FIGURE INTO RIGHT TRIANGLES



84°
370
514
144
99°
2
3
1
556
4
408
186
116°
105°
255
8
5
7
71
6
243
305
136°
99
167
206
62

Draw traversed figure to scale on graph paper. Break into triangles and scale off distances.

1. ½ (512) (255) = 65,280 m2
2. ½ (310) (556) = 86,180
3. ½ (144) (556) = 40,032
4. ½ (186) (408) = 37,944

TOTAT AREA = 251,314 m2

5. ½ (71) (243) = 8,505 m2
6. ½ (62) (71) = 2,201
7. ½ (99) (84) = 4,158
8. ½ (84) (167) = 7,014

$$\frac{251,314 \text{ m2}}{10.000 \text{ m2/ha}} = 25.13 \text{ hectares}$$

(Fig. 37)

Area Traverse

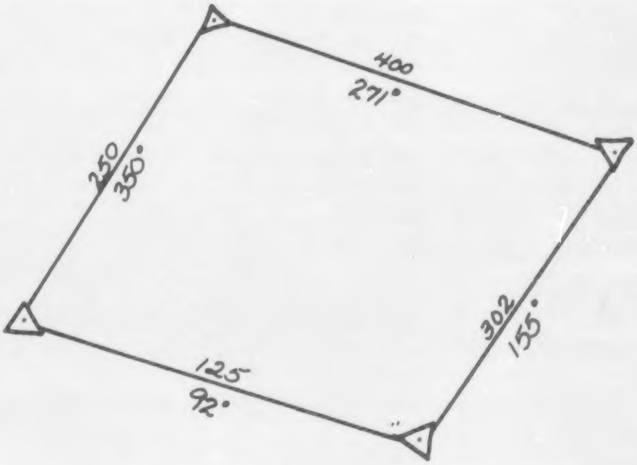
Keeping records - what, again?
Field book traverse records

Sta	Dist	Bearing
1		580°E (100°) B.S. N80° (265°)
	401	
2		585°W B.S. N86°E (265°)
	326	
3		N 10°E B.S. S11°W (10°)
	189	
1		

Field Sketch

Hypothetical Data Sheet

Date: November 18, 1981
Weather: Clear
Crew: Joan Gonzales
Peter PCV
Pedro Garcia
Tools: Hand Compass & Pacing



(Fig. 38)

3. In the small groups which trainees have worked during this session, they go out and practice the use of a plane table and rustic transit.

4. Forester trainer checks each group's area map, calculations and traverse.

Trainer's Note: While forester trainer works with one group at a time the other groups use plane table and rustic transit. This gives everyone time to practice. This is also a time to observe how well forester trainees are able to transfer skills, explain, have patience etc., with generalist trainees. Record these observations because you will want to give forester trainees feedback during interview on their performance.

SESSION XXVII

Spanish Language

Total Time: 1½ hours

Overview

Since trainees have had a very active session previous to this one, this is a good time for them to try summarizing in Spanish the activity of the morning. They may want to use newsprint and marker to illustrate points.

Procedures

Time	Activities
	1. Language instructor asks each trainee to summarize one activity of the morning session.
	2. Vocabulary
	3. Grammar

Vocabulary

North pole - polo norte
South pole - polo sur
North - norte
South - sur
East - este
West - oest
Northwest - noroeste
Southwest - suroeste
Northeast - noreaste
Southeast - sureste
Compass needle - aguja de brujula
Compass bearing - rumbo
Flogging, ribbon - cinta
Distance measurement - medida de distancia
Compass (for drawing circles) - compas
Cardinal directions - direcciones cardinales
Surveyor (of land) - topografo, agrimensor
Right triangle - triangulo recto
Rectangle - rectangulo
Square - cuadro; cuadrado
Parallel - paralelo
Compass - brujula
Stake - estaca
Azimuth - azimut
Angle - angulo
Degree - grado
Map - (el) mapa

Forestry Extension

Total Time:

Goals:

1. To identify and discuss what participants have learned about extension work up to this point.
2. To explore and apply these conclusions at the mid-point in training.
3. To assess and develop strategies which will enhance the consideration and improve acceptance of extension as part of forestry.

Overview

This session will provide an opportunity for participants to consolidate their learnings and discuss and clarify their ideas regarding extension work. It will also provide an opportunity to apply some of these learnings to activities PCVs can implement in their communities and provide an overview of different ways in which extension work can be integrated in the PCVs work.

Materials: Flip chart, marker pens, tape.

SESSION XXVIII

Forestry Extension

Procedures

Time	Activities
5 minutes	1. Introduce session by briefly stating its goals and presenting an overview of the session.
Individual discussion 20 minutes	2. Ask participants to individually identify the major things they have learned regarding extension by writing down on a piece of paper the four or five thoughts or ideas which stand out in their minds as being most important about extension. Trainer can briefly summarize each extension session before participants start in order to help them remember and identify their learnings.
Sub-group work 15 minutes	3. Ask participants to form groups of five or six and share their most important conclusions of extension work. Ask them to look for similarities and differences and select any ideas, questions, concerns, they want to present to the total group.
Group discussion 20 minutes	4. Reconvene and ask participants for important ideas, questions or concerns which they discussed in their small groups. Example: You have identified ideas, questions, concerns, and now have some conclusions regarding extension. Are there any important thoughts you want to share with the group? Any similarities or differences which surprised you? Were there any concerns raised in your small group discussion you want to bring to the group? Trainer jots down on newsprint, remarks for each group. A discussion ensues based on statements and questions made by participants.
Individual work 15 minutes	5. Ask participants to do individually the following task:

Task: Based on what you have learned about extension, what could you do differently (strategies, actions, activities) as a PCV starting extension work. Think of the following aspects of your future work:

a) entering the community,
b) getting to know the community,
c) meeting community people and making friends,
d) identifying community needs,
f) entering the job,
g) establishing secondary projects,
h) evaluating "how are you doing" as a PCV.

This is not an exhaustive list and participants do not need to address each of these areas. It is a guideline to help them think about the different aspects of their work and different actions they might take to consider extension projects and communities.

sub group analysis
20 minutes

6. Ask participants to form groups of two or three and discuss their individual analysis. As they discuss, they should pay attention to which actions or strategies seem to address extension work more effectively; which seem more feasible given the culture, history and considerations in the host country; which are more practical and easy to implement. They should select the best strategies or activities to present to total group and receive feedback from other participants and trainer. The subgroups task can be presented on a flip chart as follows:

Task: Discuss your strategies or actions taking into consideration their effectiveness, cultural appropriateness and feasibility. If necessary, develop new strategies out of your discussion. Select the best strategies to present for analysis and feedback.

group discussion
30 minutes

7. In general session, trainer asks for examples of participants strategies. Trainers react to proposed strategies using the following guidelines:

- most likely to succeed strategies and why,
- most likely to fail strategies and why,
- suggestions and new ideas about strategies and activities which work and do not work based on their own experience.

Closure
10 minutes

8. Trainer summarizes session by presenting or developing with the participants a list of different ways in which extension can take place in Peace Corps activities.

Materials: Newsprint for activities #5 and 6.

Forest Mensuration

Total Time: 3½ hours

Goals:
- o To have each trainee construct their own cruiser stick and learn how to use it.
- o To instruct trainees in forest mensuration and provide a simple method for determining forest volume.
- o To look at helping skills.

Overview

In this session participants will make a Biltmore Stick and learn how to use it in forest measurement. One of the trainees who has taken on making a Biltmore Stick instructs other trainees. Trainees look at one another's helping skills and give feedback.

Exercises:
1. Construction and use of a cruiser stick.
2. Lecture on forest mensuration.
3. Groups: Helping skills.

Materials: Flip chart, marker pens, tape
- o 1 board 1 meter long X 5 cm wide X 1 or 2 meters thick for each trainee
- o Number table
- o Knife to scratch graduation marks
- o Waterproof pen to identify graduation
- o Conversion factors for U.S. and metric units

Exercise I: Construction and Use of Cruiser Stick

Total Time: 2 hours

Overview

In this exercise trainee instructs other trainees in the construction and use of cruiser stick which is an instrument that can be used as:

a) Biltmore Stick - to measure tree diameter
b) Merritt Hypsometer - to measure tree height
c) Meter Stick - to measure length

Procedures

Time	Activities
15 minutes	1. Trainee/Instructor has all necessary materials assembled for this exercise. He/she then gives a brief lecture on the purpose of a cruiser stick using one he/she has made for demonstration.
45 minutes	2. Trainee/instructor now shows participants how to make their own cruiser stick and the participants do so.
1 hour	3. Trainee/instructor along with technical instructor takes trainees who have been divided up into small groups with a forester in each group out to a stand of trees and trainees practice using cruiser stick for measuring trees. In turn, they calculate the volumes of trees using table provided.

Trainer's Note: We have included here number tables or formulae to calculate graduations on cruiser stick but suggest that trainee who takes this on as a special project figure out these tables for him/herself.

We have also given conversion factors for U.S. and Metric Unit Charts to participants during this exercise.

CONSTRUCTION AND USE OF A CRUISER STICK

Cruiser Stick:

a. Biltmore stick - measure tree diameter,
b. Merritt Hypsometer - measure tree height,
c. Meter stick - measure length.

Materials:

a. Board: 1 meter long X 5 cm wide X 1 or 2 cm thick.
b. Number table or formulas to calculate graduations.
c. Knife to scratch permanent graduation marks.
d. Pen with waterproof ink to identify graduations and write needed information on stick.

I. **BILTMORE STICK** - To measure tree diameter.

A. Construction

Use hardwood board (1 meter long), knife, and marker. First determine reach. Reach is the distance from cruiser's eye to the stick held out in front of his/her hand. Find if your reach (eye to outstretched hand holding board) is more comfortable at 57cm or 65cm. Graduations for specified reaches of 57 to 65 cm are on the number table. Starting from the left end graduate the stick using the number table. The number table provides graduations for measuring DBHs of 1 - 153 centimeters. DBH marks are placed every G centimeters from the left end of the stick.

If a number table is not available for your specified reach it is possible to construct one using the following formula:

$$G = D^2R/_D + R$$

Where:

G = distance (cm) from zero mark (left end of stick to D-cm graduations,

D = diameter mark (cm) currently being placed on stick,

R = reach in centimeters.

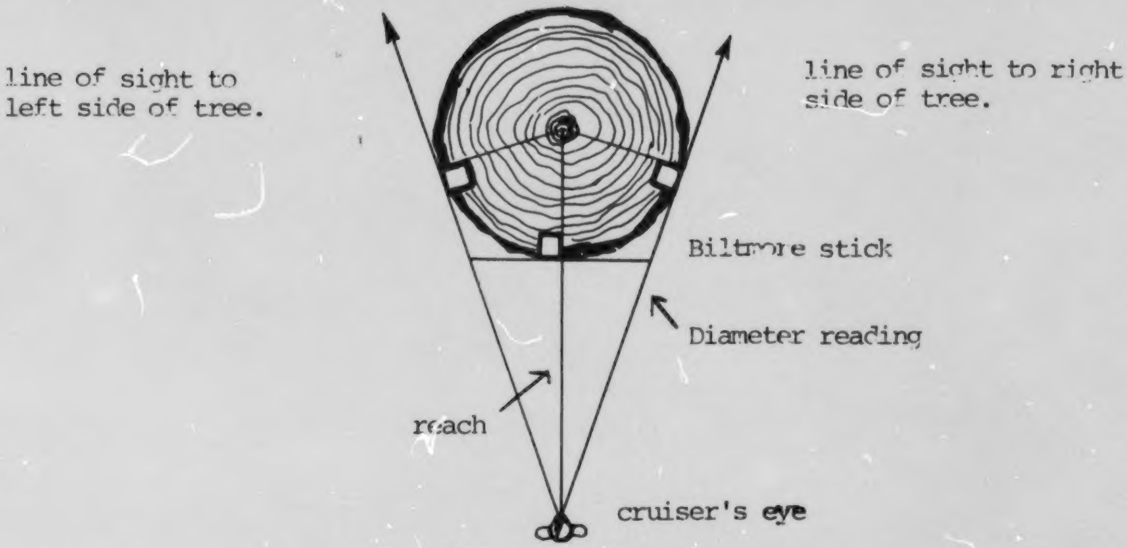

line of sight to left side of tree.
line of sight to right side of tree.
Biltmore stick
Diameter reading
reach
cruiser's eye

Fig. 39 - Use of the Biltmore Stick showing similar triangles.

B. USE OF THE BILTMORE STICK:

1. The Biltmore stick is held against the tree with the line of sight to the left side of the tree crossing the zero end of the scale. The diameter of the tree is then read at the point where the line of sight, to the right side of the tree crosses the scale (see figure 1).

2. The following precautions must be observed to obtain accurate readings with the Biltmore Stick:

   a. The stick must be held against a tree.
   b. The stick must be perpendiculr (at right angles) to the trunk of the tree.
   c. The stick must be perpendicular to the imaginary line between the observer and the tree.
   d. The cruiser's head must not be moved during the measuring operation.
   e. The stick is calibrated for a specified reach. This means that the cruiser's eye must be exactly the specified distance from the stick.

II. **MERRITT HYPSOMETER** - To measure tree height.

A. CONSTRUCTION

The Merritt Hypsometer scale for measuring tree height in meters is placed on the back side of the cruiser stick. This scale is calibrated for the same reach as the Biltmore Stick on the other side.

The Merritt is designed for use at a particular distance from the tree (30 meters for graduations on number chart). This base distance of 30 meters should be printed on the scale. Graduations, beginning with zero at the bottom of the stick, are found on the number table for your specified reach. Using the number table, tree heights of 1 - 40 meters can be measured.

If a number table is not available for your specified reach it is possible to construct one using the following formula:

$$L + H \times R/_{B}$$

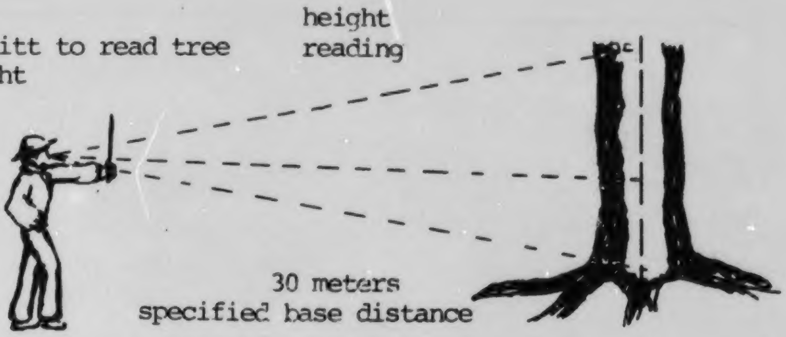
Where:

L = length (cm) to be marked off on stick for each H meters of tree height,

H = tree height in meters,

B = base distance in meters,

R = reach in centimeters.


Merritt to read tree height
height reading
30 meters
specified base distance

(Fig. 40)

$$\frac{L}{H} = \frac{R}{B}$$

$$L = H \times \frac{R}{B}$$

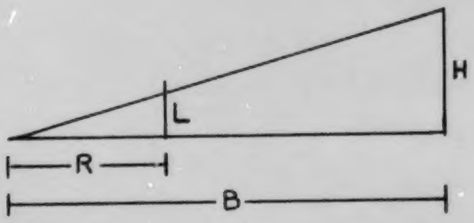


Fig. 41 - Basis for Merritt Formula.

B. USE OF MERRITT HYPSOMETER:

1. The cruiser stands at a specified distance (30m) from the tree, with the hypsometer scale held vertically at arms' length. The bottom end of the scale is moved upward or downward until it is on the line of sight to the base of the tree. Tree height, in meters, is then read at the point where the line of sight to the upper limit of the stem intersects the scale (see figure 2).

2. The following precautions must be observed to obtain accurate readings with the Merritt Hypsometer:

    a. The stick is designed for use at a particular base distance (horizontal distance) from a tree. This distance should be printed on the scale.

    b. The stick is calibrated for a specified reach. This should be the same specified reach as for the Biltmore on the other side.

    c. Failure to hold the stick vertically will cause inaccurate readings.

III. **METER STICK** - To measure length.

The stick for the Biltmore and Merritt should be 1 meter long. On the side one can add a centimeter scale. This will provide the cruiser with a handy measuring stick.

(m) TREE	cm from bottom of stick	
Height Mark	57 cm reach	65 cm reach
1	1.90	2.17
2	3.80	4.33
3	5.70	6.50
4	7.60	8.67
5	9.50	10.83
6	11.40	13.00
7	13.30	15.17
8	15.20	17.33
9	17.10	19.50
10	19.00	21.67
11	20.90	23.83
12	22.80	26.00
13	24.70	28.17
14	26.60	30.33
15	28.50	32.50
16	30.40	34.67
17	32.30	36.83
18	34.20	39.00
19	36.10	41.17
20	38.00	43.33
21	39.90	45.50
22	41.80	47.67
23	43.70	49.83
24	45.60	52.00
25	47.50	54.17
26	49.40	56.33
27	51.30	58.50
28	53.20	60.67
29	55.10	62.83
30	57.00	65.00
31	58.90	67.17
32	60.80	69.33
33	62.70	71.50
34	64.60	73.67
35	66.50	75.83
36	68.40	78.00
37	70.30	80.17
38	72.20	82.33
39	74.10	84.50
40	76.00	86.67

DBH Mark (cm)	cm from left end of stick	
	57 cm reach	65 cm reach
1	0.99	0.99
3	2.92	2.93
5	4.79	4.82
7	6.61	6.65
9	8.36	8.43
11	10.07	10.17
13	11.73	11.87
15	13.25	13.52
17	15.13	15.14
19	16.45	16.71
21	17.95	18.26
23	19.41	19.77
25	20.84	21.25
27	22.24	22.69
29	23.61	24.12
31	24.95	25.51
33	26.26	26.88
35	27.55	28.22
37	28.81	29.54
39	30.05	30.83
41	31.27	32.11
43	32.46	33.36
45	33.64	34.59
47	34.80	35.81
49	35.93	37.00
51	37.05	38.18
53	38.15	39.34
55	39.24	40.48
57	40.31	41.61
59	41.36	42.72
61	42.40	43.81
63	43.42	44.89
65	44.43	45.96
67	45.43	47.02
69	46.41	48.06
71	47.38	49.08
73	48.34	50.10
75	49.28	51.10
77	50.22	52.10
79	51.14	53.08
81	52.06	54.05
83	52.96	55.01
85	53.85	55.95
87	54.74	56.89
89	55.61	57.82
91	56.47	58.74
93	57.33	59.65
95	58.18	60.55
97	59.01	61.44
99	59.84	62.33
101	60.66	63.20
103	61.48	64.07
105	62.28	64.93
107	63.08	65.78
109	63.87	66.62
111	64.66	67.46
113	65.43	68.28
115	66.20	69.11
117	66.97	69.92
119	67.72	70.73
121	68.47	71.53
123	69.22	72.32
125	69.95	73.11
127	70.69	73.89
129	71.41	74.67
131	72.13	75.44
133	72.85	76.20
135	73.56	76.96
137	74.26	77.71
139	74.96	78.46
141	75.65	79.20
143	76.34	79.94
145	77.02	80.67
147	77.70	81.40
149	78.38	82.12
151	79.05	82.83
153	79.71	83.54

Conversion Factors for U.S. and Metric Units

To convert column 1 into column 2, multiply by	Column 1	Column 2	To convert column 2 into column 1, multiply by
	Length		
0.621	kilometer, km	mile, mi	1.609
1.094	meter, m	yard, yd	0.914
0.394	centimeter, cm	inch, in	2.54
	Area		
0.386	kilometer^2, km^2	mile^2, mi^2	2.590
247.1	kilometer^2, km^2	acre, acre	0.00405
2.471	hectare, ha	acre, acre	0.405
	Volume		
0.00973	meter^3, m^3	acre-inch	102.8
3.532	hectoliter, hl	cubic foot, ft^3	0.2832
2.838	hectoliter, hl	bushel, bu	0.352
0.0284	liter	bushel, bu	35.24
1.057	liter	quart (liquid), qt	0.946
	Mass		
1.102	ton (metric)	ton (U.S.)	0.9072
2.205	quintal, q	hundredweight, cwt (short)	0.454
2.205	kilogram, kg	pound, lb	0.454
0.035	gram, g	ounce (avdp), oz	28.35
	Pressure,		
14.50	bar	lb/inch^2, psi	0.06895
0.9869	bar	atmosphere, atm	1.013
0.9678	kg(weight)/cm^2	atmosphere, atm	1.033
14.22	kg(weight)/cm^2	lb/inch^2, psi	0.07031
14.70	atmosphere, atm	lb/inch^2, psi	0.06805
	Yield or Rate		
0.446	ton (metric)/hectare	ton (U.S.)/acre	2.240
0.892	kg/ha	lb/acre	1.12
0.892	quintal/hectare	hundredweight/acre	1.12
	Temperature		
$\left(\frac{9}{5}\,°C\right) + 32$	Celsius	Fahrenheit	$\frac{5}{9}\,(°F - 32)$
	−17.8C	0F	
	0C	32F	
	20C	68F	
	100C	212F	
	Water Measurement		
8.108	hectare-meters, ha-m	acre-feet	0.1233
97.29	hectare-meters, ha-m	acre-inches	0.01028
0.08108	hectare-centimeters, ha-cm	acre-feet	12.33
0.973	hectare-centimeters, ha-cm	acre-inches	1.028
0.00973	meters^3, m^3	acre-inches	102.8
0.981	hectare-centimeters/hour, ha-cm/hour	feet^3/sec	1.0194
440.3	hectare-centimeters/hour, ha-cm/hour	U.S. gallons/min	0.00227
0.00981	meters^3/hour, m^3/hour	feet^3/sec	101.94
4.403	meters^3/hour, m^3/hour	U.S. gallons/min	0.227

3.28 ft = 1m

Exercise II: __Forest Mensuration Lecture__

__Total time:__ 1 hour

Overview

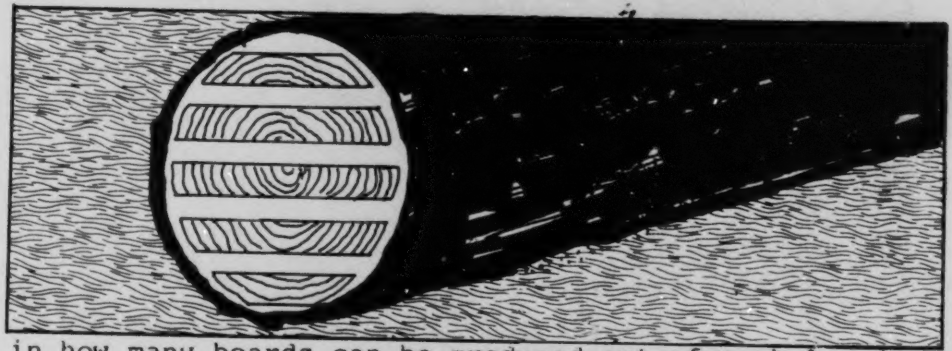
The purpose of this lecture is to aquaint the trainees with forest mensuration and provide a simple method for determining forest volume.

Procedures

Time	Activities
	1. Technical trainer gives following lecture posting lecture outline on newsprint.

OBJECTIVES: To acquaint the trainees with forest mensuration and provide a simple method for determining forest volume.

Trainer explains how volume is determined and diagrams instructions.

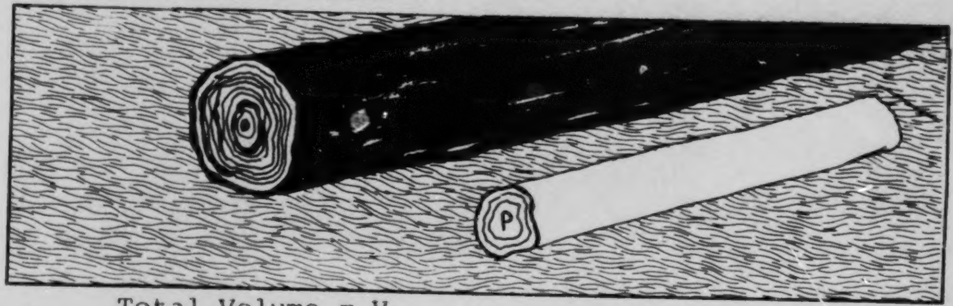


(Fig. 42)

Draw in how many boards can be produced out of each log depending on diameter of small end of log.

VOLUME = end area in board feed$/_{12}$ X length

How Volume is determined - Formula rules



Diameter
small end of log

(Fig. 43)

Total Volume = V

$V = \text{Area small end}/_{12}$ X Length

$V = .06545(D^2)(\text{Length})$

Less Slab - Deduct 2" - 4" from Diameter (Variable X)

$V = 06545(D - X)\text{length}$

Less kerf = $^{K}/_{K \pm T}$

Explanation of what is saw keft

A=% of volume deduced for saw kerf
K = Thickness of saw kerf
T = Thickness of board

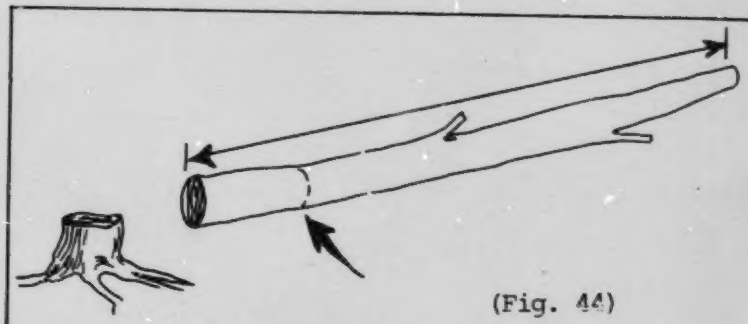
$V = (1-A).06545(P-K)^2L$

Standard Volume Table

Sample trees

Altura (height)

DAP (DBH)



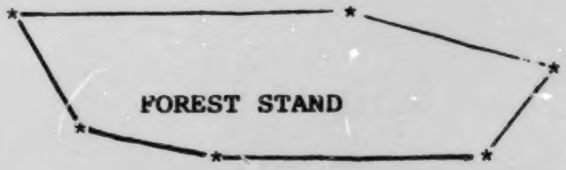
(Fig. 44)

- Trees felled and bucked into logs
- "DAP" and "altura" taken
- Calculation of volumes made by log and totaled for each tree sampled
- Volumes of trees in same DAP and altura class averaged and put in tabular form

DAP	Altura				
	10	15	20	25	30
14	0.081	0.103	0.126	---	---
16	0.098	0.128	0.159	---	---

Forest Area

Important: Determine area of forest



If it is done first or last: You have to know area of forest to compute the total volume.

Forest stand area for purposes of example calculated to be 6.5 hectares.

Planning the Field Work

(Planificación de trabajo de terreno)

- Delineate Forest Types
- Make types as homogenous as possible

1 monoculture

Planted	planted	planted
1952	'52	'55
70% stocked	30% stocked	100%

Planted 1955
70% stocked

2 monocultures (native)

Major species
X, Y and Z
70% stocked

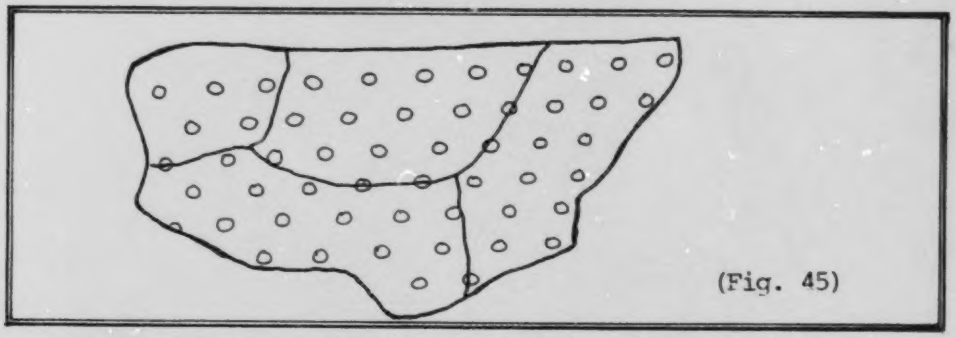
Major Species A,B and C
30% stocked

Major species A,B and C
70% stocked

Plot Layout

(Sistema de Ubicación de parcelas)

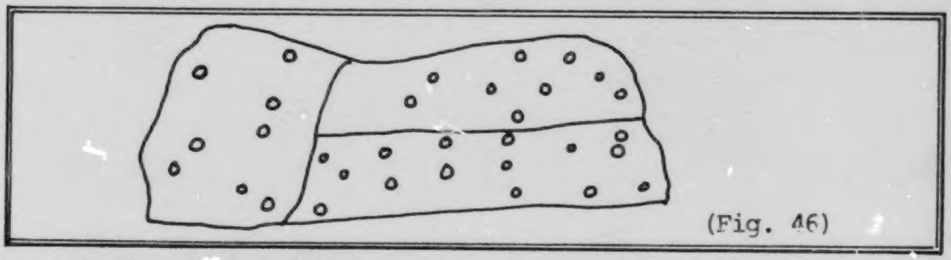
-Systematic



(Fig. 45)

Plots layed out at set distance from one another along a straight line; lines evenly spaced, and should cross drainages

-Random



(Fig. 46)

Plots located randomly - no pattern

1. Lay out on graph paper with X & Y coordinates; pick

random numbers for X and Y coordinates to plot.

2. Throw beans or rice over map of area.

Plots (Parcelas)

Circular

$A= r^2$
$r^2=A/$

$r= 100m^2/3.14169$

$^1/_{10}$ Hectares

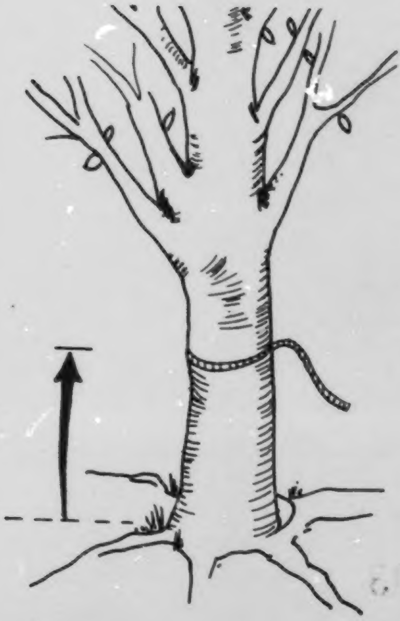
(Fig. 47)

Square
(cuadrado)

10 meters
10 meters

(Fig. 48)

Diameters
DBH=DAP

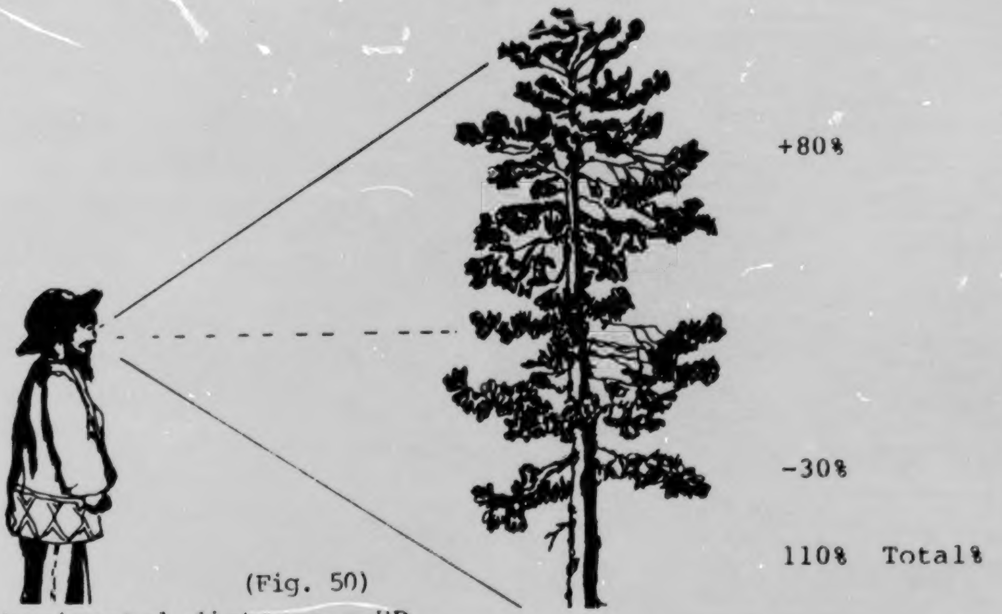


(Fig. 49)

Heights

For "shooting" tree heights all measurements are.....

HORIZONTAL DISTANCE



(Fig. 50)

Horizontal distance = HD
= 40m

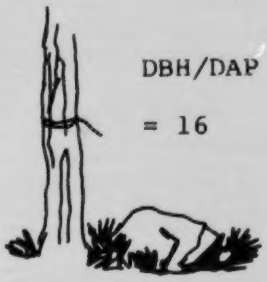
Tree Height = HD X %
= 40 X 1.10
= 44 meters

Field Notes

Species	Plot	DAP	ALTURA	DEFECT	Notes	Volume*
	1	14	42	-0-		
		18	46	10%		
		26	69	-0-		
	2	22	61	-0-		
		28	75	10%		
		32	79	-0-		

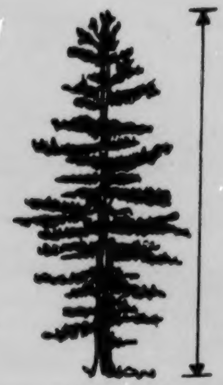
*Add Volume using table described below.

Determining Volume of a Tree (Determinación de Volumen de un árbol)



(Fig. 51)

DAP	Altura en Metras		
	10	15	20
14	0.084	0.108	0.133
16	0.099	0.131	0.163



(Fig. 52)

0.163 = Volume of Tree

Total Volume Cruised by Forest Type

Plot No.	Total volume for each plot
1	$8.172m^3$
2	12.101
3	15.111
4	11.002
5	10.301
6	9.221
Total Cruise Volume	$65.908m^3$

Total Volume of Stand

Total cruise volume = $65.908m^3$
Total no. of plots = 6

$65.908m^3/6$ = $10.985m^3$/Plot (Average)

size of plot = $^1/_{10}{}^{ha}$

$10.983m^3/_{Plot}$ x 10 $Plots/_{ha}$ = $109.85m^3/_{hectare}$

Area Estimation = 6.5 has

$109.85m^3/_{Ha}$ x 6.5Has = $714.025m^3$
= Total Volume of Stand

Exercise III **Group Helping Skills**

Total Time: 1 hour

Overview

During this session, it has been necessary for generalist trainees to lean on forester trainees for help in understanding and using a cruiser stick. The generalist trainees will need further help understanding the intricacies of forest mensuration. The trainees will give feedback to forester trainees and vice versa.

Procedures

Time	Activities
½ hour	1. Technical trainer asks groups formed earlier to use cruiser sticks to regroup. Technical trainer asks forester trainees to go over forest mensuration with generalist trainees and to answer questions they may have about forest mensuration and clear up any misunderstandings. Technical trainer floats during this period and can be called on as a resource person.
15 minutes	2. Groups are now asked to give each other feedback on skills transference during session: The following guidelines are posted on newsprint. Forester Trainee: 2.1 Ask for feedback from others on your ability to help them. o What did it feel like to be a giver of help and what can we learn from this? o What may be different about helping others in host country? o How might cultural variables affect a helping relationship? Generalist Trainees: o How can I approach others for help (Be it PCVs or HCNs)?

- How was I perceived as a helpee during this session?

15 minutes

- What did it feel like to be helped and what can I learn from this?
- Putting myself in a HCN's shoes, what might it feel like to get technical help?

2.3 All Trainees

- How can we apply the helping relationship to extension work in forestry?
- What things have we learned in this exercise that might help or hinder us as extension workers?

15 minutes

2.4 Trainer asks groups for their findings on things that help/hinder and writes them on newsprint. Forester trainer now summarizes the learnings about helping relationships.

Spanish Language

Total Time: 1½ hours

Overview

During this session trainees will review the different instruments they have made up; diameter tape and cruiser stick and try to form sentences describing how these instruments are used. More advanced students will prepare charlas describing use of instruments. Vocabulary is reviewed for pronunciation and sentence construction.

Procedures

Time	Activities
	1. Review in Spanish of instruments that have been made. Includes forming of sentences to describe their use.
	2. Vocabulary review.
	3. Sentence construction.

Language Instructor's Note: You may want to start giving simple assignments for future classes at this point. Remember that trainees have other assignments they are working on. Assignment time should not exceed ½ hour outside class at this time.

Vocabulary

Monoculture - monocultura
Contour - contorno curva de nivel
Contour planting - siembra a nivel
Contour map - plano topografico
Level - nivel
Terrace - terraza
Teeth - diente
Terminal bud - baton terminal; yema terminal
Path - sendero, senda, pique
Ox - buey
Landslide - derrumbe
To freeze - congelar, helar
Frost - escarcha, helada
Broadcast seeding - siembra al voleo
To dig - cavar; excavar
Slope - pendiente
To destroy - destruir, destrozar
Bare roots - raices desnoda
Horizon, layer - capa
Azimuth - azimut
Sand - arena
Sandy - arenoso
Measuring tape - huincha para medir

Surveying - agrimensura

Vocabulary (Continued)

Porous - poroso
Meadow - prado
North pole - polo norte
Mud - lodo
Flat, plain (flatland) - llano
Volume - volumen
Fill - relleno
Epidemic - plaga

SESSION XXXI

Working with Groups as an Extension Worker

Total Time: 1 hour 45 minutes

Overview

This session continues to focus on extension work. Working with groups is stressed as a way of doing extension work.

Procedures

Time	Activities
30 minutes	1. Trainer gives lecture on why it is best to try to do extension work with groups of people, rather than individuals. Trainer goes into group dynamics and stresses risk taking. (Sample lecture follows)

Trainer's Note: Lecture should be in your own words, use situations with which you are familiar to stress points.

Sample Lecture

AWARENESS

↘

INTEREST

↘

EVALUATION

A propensity to take risk supported by rational decision making processes in the evaluation stage, or promoted through behavioral techniques utilized by extension agents.

↘

TRIAL

↘

ADAPTATION

Why Organize Groups

Both subsistence farmers and large land holders, are less disposed to take risk on an individual basis. The behavioral tool however, or the risk-shift phenomenon largely used in a business-making atmosphere, can be used more effectively to promote risk taking by small groups of people involved in collective decision making.

Small groups of people concerned with decisions that involve some element of risk, unlike large group members, will, after engaging in various modes of group discussion, make a collective decision that is far more risky than their individual decision on the same matter would be. Key elements here is that group discussion on a matter of importance must take place to the point of group consensus on that particular matter before the shift occurs.

In the case of subsistence farmers, much depends upon the extension agent's ability to explain the risk involved to group members, and consequently show how the new technology substantially exceeds, in cost/benefit advantages, the farmer's present traditional technology.

For example, if an extension agent suggests to a group of farmers that a particular technology or agricultural technique could improve productivity, but is unable to explain how much the technology would cost, where it could be obtained, how to use it and what benefits could be expected from its use, one can rightly predict that conservative influences will prevail and a risk decision will not be taken to adapt the technology.

There are four major hypotheses that support the process of group acceptance of risky technical innovations. These four are the leadership, familiarization, diffusion-of-responsibility and risk-as-value hypothesis. In order for risk-shift to occur, regardless of the particular hypothesis, a group discussion to the point of group consensus on the issue must take place beforehand; for without discussion and consensus the shift will not occur.

In the leadership hypothesis, it is believed that certain group members are viewed as both natural risk takers and group leaders who have an above average influence on the rest of the group membership. The risk-shift condition is believed to occur because these people are inclined to be more dominant and/or influential in the group discussions and consequently influence the group in the direction of accepting risk. However, a behavioral problem with the leadership approach is that leaders can be either conservative influencers or risk takers under certain circumstances. This brings us back to the extension agent's ability to explain adequately the nature of the risk involved: An effective group leader can play a very conservative role if he perceives that the extension agent does not know what he/she is talking about or has not adequately explained the risk involved. Once convinced that a suggested program is adequately organized and supported, leaders become effective promoters.

Current thought on the role of opinion leaders in village societies is that extension agents should be made aware of the potential effect, negative and/or positive, leaders can have on the transference of new technology to group members.

Familiarization: Group discussion allows persons to become more familiar with the issue being discussed and consequently increases familiarity with the issue. As a result of becoming familiar with other group members' attitudes toward the risk, members will be even more willing to take a risk because they know where all the members stand on the particular issue. (Rogers: "There appears to ba a pooling effect in media forums (groups) by which those members who begin at lower levels of knowledge, persuasion, or adoption gain more in these respects than do forum group members who begin at higher levels. Knowledge reduces risk)."

A group of peasant farmers (who have attained at least the minimum capacity to function together as a cohesive desicion-making unit) in deciding whether or not to take the risk to adopt a new technology (which could be deadly if not successful and the crop of trees is lost), should test the technology by discussing and becoming familiar with its stated objective - to improve production.

Diffusion of Responsibility: It is felt that group discussion and cohesion develops emotional bonds between members and frees the individual from full responsibility for his risky decision. An individual feels that his decision has been shaped by the group and if it fails, he is no worse off than the others since they will fail together. It is difficult for subsistence farmers particularly in the Latin American countries to establish strong emotional bonds with each other, even in many cases, when they are related. In Latin America there appears to be a great deal of factionalism. Short term groups will probably not develop strong emotional ties in any event.

This hypothesis cannot account for cautious shifts. The hypothesis does not specify how the creation of emotional bonds among subjects makes them less concerned about the negative consequences of risky decisions.

Most damaging of all appears to be the exchange of relevent information, not the development of emotional bonds that is necessary for the risk-shift to occur.

Risk as Cultural Value: This hypothesis maintains that moderate risk has a cultural-value which develops during the life span of a group and consequently individuals come to view themselves as being as willing as their peers (within the group culture) to take risks. The major mode of implementation is peer pressure to conform the deviants who are not reflecting views of the majority of the group's members.

All of the hypotheses interact in varying degrees to produce the shift in small group decision-making.

Let's go back to familiarization and talk about that process, information exchange, feedback and group discussion.

Variables to Risk Taking

Not Known or Understood

Not Within Farmer's Managerial Competence

Farmers may have heard but the comprehension of what it can do or the effective utilization of the new technology may require additional knowledge and skills which they are now lacking.

Not Socially, Culturally or Psychologically Acceptable

A great deal is made in the development literature of those cases where a new practice or a new technique has not been adapted because it would upset too severely the established patterns of social or economic political organization.

Not Technically Viable or Adequately Adapted

Very often the new recommended technology has not in fact been locally adapted or tested under conditions which more closely approximate those faced by the farmer. Subsistence farmers are shrewd and can discern whether the new variety or practice has had enough adaptive research and local testing to meet their unique local needs.

Not Economically Feasible

Probably the biggest single cause of resistance to change is the unprofitability of the new technology as seen by the farmer. Often the new technology requires the purchase of additional inputs to achieve the higher productivity and these inputs have a cost. Further, when the farmer compares the expected output plus its associated income with the additional costs of the input, the balance sheet employing the new technology is found wanting.

Not Available

Often the new technology is embedded in a physical item such as seeds, pesticides, fertilizer or equipment. Unless the new item is readily available to the farmer in quantities at the time he needs it, knowledge of its potential contribution to his agricultural production will not result in its adaptation.

30 minutes

2. Divide into small groups and give each group a different problem (see examples) to search their own experience for specific examples of situations in which they encountered a similar problem and what solutions were used in that group situation. Would it work here in host country?

3. Groups give presentations to large group on problems they had, experiences that were similar, and possible solutions:

- Problems ensure that effort is maintained when extensionist is drawn.
- To get outside organizations (including local governments, voluntary organizations and technical departments) to cooperate in forestry extension work.
- To get local leaders to cooperate.
- To work in a community divided by racial or religious factions or by other factional rivalries.
- To regain the confidence of a community once it has been lost.

5 minutes 4. Trainer draws learnings from presentations that would apply to extension work. Asks for generalizations about groups from participants.

5. Trainer now does summary of the three sessions on extension work. Conclude with the following:

1. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. The relative advantage of a new idea, as perceived by members of a social system, is positively related to its rate of adoption.

2. Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experience, and needs of the receivers. The compatibility of a new idea, as perceived by members of a social system, is positively related to its rate of adoption.

3. Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption.

4. Trialability is the degree to which an innovation may be experimented with on a limited basis. The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

5. Observability is the degree to which the results of an innovation are visible to others. The observability of

an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

(Communication of Innovation by Rogers & Shoemaker)

After studying more than 1500 publications on the diffusion of ideas and the change process, Rogers and Shoemaker found that extensionists were more successful when they:

1. Expand more effort in change activities with communities;
2. Are community oriented rather than change agency oriented;
3. Propose programs compatible with community needs;
4. Have empathy with their communities and community members;
5. Are similar to their community members;
6. Work through opinion leaders;
7. Have credibility in the eyes of their community;
8. Increase their community's ability to evaluate innovations.

Reference: "Training for the Cross-cutural Mind," The Society for International Education, Training and Research, Washington, D.C., 1980.

Everett Rogers and Floyd Shoemaker,
Communication of Innovations: A Cross-Cultural Approach,"
"New York Free Press, 1971.

Allen D. Jedicka
Praeger Publications
200 Park Avenue
New York, New York 10017
Organization for Rural Development. 1977

Agro-Forestry

Total Time: 4 hours

Goals:

- To introduce agro-forestry as a possible marriage.
- To explore the concept of forestry in combination with agriculture or livestock.
- To explore the agro-forestry as a good concept.
- To explore agro-forestry as an extension technique.
- To look at elements necessary in planning an agro-forestry project.

Overview

Agro-forestry as a sub-discipline of forestry is a concept recognized in the last ten years but it should be pointed out that farmers have been practicing agro-forestry for hundreds of years. As a new discipline, there is not yet a great deal written about the subject. There are currently, probably, thousands of projects being researched and investigated throughout the world. In this session we explore the concepts of agro-forestry and look at agro-forestry in extension work. Each participant's agro-forestry plan is evaluated and questions answered. It should be pointed out that the participants in this training program are undoubtedly the pioneers in this discipline who will write the books on agro-forestry.

Trainer's Note: Agro-forestry plans written by trainees are submitted the day before, to give trainers a chance to review them before presentation.

Exercise: I. Lecture on Agro-Forestry
II. Response to individual agro-forestry plans by trainees.

Materials: flip charts, marker pens, tape, article "Can Farming and Forestry Coexist in the Tropics?"(Optional).

Trainer's Note: During the pilot of this training program, we were able to get a researcher in and practitioner of agro-forestry in the Amazon Basin to give this lecture and review individual plans. This is an optimum alternative to this session unless one of the technical trainers has a great deal of experience in this field. Since practioners are hard to come by, we have tried to make this outline as comprehensive as possible. A lecture by an expert is included in this section.

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Can farming and forestry coexist in the tropics?

John S. Spears

Five World Bank projects are examined from the point of view of how they answer human needs for the kind of sustainable forestry and farming that are harmonious with tropical forest ecosystems. How can forestry benefit people as well as conserve increasingly endangered forests? These studies are taken from Malaysia, Colombia, Kenya, Indonesia and the Philippines.

During recent years environmental agencies, particularly in the United States, have done a valuable job in drawing public attention to the rate of tropical forest destruction and mobilizing awareness of the need for more effective forest protection policies. During this century the area of tropical forest of the world has declined by more than a half. FAO's latest estimates expect a further 10 to 15 percent decline by the end of the century, and it is possible that, unless something is done to reverse the present trend, by the middle of the next century, the bulk of the tropical forest ecosystem as we know it could disappear. Botanists, ecologists and environmentalists have pointed out the irreversible loss to mankind which would result, citing, in particular, the loss of genetic material and the potential contribution to human welfare of drugs and medicines available from tropical woody plants. Many international conferences have been held to help create better political awareness of these issues.

However, a deliberate shift in the emphasis of conservation and development strategy is needed. If we are to ensure preservation of a significant part of the world's remaining tropical forest ecosystem, we should focus more on how to improve the incomes and quality of life of the 200 million subsistence farmers living in a state of shifting cultivation in tropical forest areas. Only the briefest glance at the history of agricultural settlement in Europe, North America and elsewhere is needed to suggest that any policy aimed at halting the present process of forest destruction while completely excluding people from the tropical forest areas is unlikely to succeed. Attacking the root cause of forest destruction — rural poverty in forest areas — and providing small farmers with a viable alternative to shifting cultivation are the key issue. An essential first step would be the recognition that a large part of the "forest destruction" taking place in tropical developing countries, which has generated such an emotional response from agencies in predominantly temperate-zone developed countries, is, in fact, a logical shift in land use to more productive agriculture.

What can be done in practical terms to make it possible for small farmers to abandon forest cutting and shifting cultivation, to adopt sustainable farming systems and to become part of more stable rural communities? What are the most appropriate choices and techniques?

A few examples of project experiences, some successful and some less so, financed partly by the World Bank may help in the search for solutions

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for reducing the risk of continued ecological degradation.

In reviewing these project experiences, I have set up three criteria:

What impact have these projects made on rural incomes? In particular, have they been effective in stabilizing rural communities and in arresting shifting cultivation?

Was adequate provision made in project design for protection of part of the forest area or for establishment of compensatory forest plantations, and has this happened in practice?

Are the cropping patterns being developed likely to be sustainable in the light of what we know about the soil structure and capability in the forest areas being settled?

Two agricultural land-settlement projects, both of which involved forest clearing followed by, in the first case, agricultural tree cropping and in the second, livestock development, are examined below.

Malaysia: the Jengka Triangle Land Settlement Project

The Jengka Triangle in the state of Pahang covers about 120 000 ha, of which about half are considered suit-

Road building in Colombia
plenty of problems

able for agricultural development. The area was identified in the early sixties as favourable for large-scale tree-crop development and settlement. While earlier land settlement took place in smaller schemes scattered throughout Malaysia and close to existing infrastructure, the Jengka Triangle was to be the largest attempt at that date for the development of virgin tropical forest lands.

In 1965, a technical assistance grant was made by the World Bank to the Government of Malaysia to help finance a land-use study of the area and the preparation of a regional development plan. The "master plan" completed in 1967 called for comprehensive development of the Triangle, comprising settlement, in a first phase, of some 9 000 farm families cultivating about 40 000 ha of oil palm and rubber; systematic exploitation of forest resources prior to settlement; urban development, including the establishment of three new townships; and extensive infrastructure development.

A first Jengka Triangle Project, commencing in 1968, planted 12 000 ha of oil palm and 1 600 ha of rubber. A second project, commencing in 1970, developed a further 7 000 ha of oil palm and 6 000 ha of rubber. Physical works included clearing of forest land, construction of houses, offices and stores to accommodate settler families, and recruitment of management and support staff. A palm-oil mill was constructed together with appropriate roads, water systems, and educational, health and other social services. About 300 ha were developed for crop diversification trials on a commercial scale. Each settlement comprised about 4 ha of planted oil palm or rubber, and a house lot of 0.1 ha for growing food crops. A third loan, made in 1973, will complete the programme.

According to the three criteria defined earlier, the project can be judged successful. Rural incomes of the 9 000 families settled in the first phase have shown a four-fold increase. Settler turnover rates are low (two percent) and the village communities are expected to remain stable. By careful forward planning and the carrying out of appropriate land-use and soil-capability surveys prior to settlement, about 80 000 ha of forest, comprising 60 percent of the project area, were excluded from agricultural settlement. Cultivation was confined to the flatter areas and hill slopes, and river banks were retained under forest. The higher levels of rural income and stable communities in the project area have reduced the risk of shifting cultivation and further forest destruction. Also, it seems reasonably certain that the cropping patterns developed in Jengka, based on perennial tree crops, are sustainable, given appropriate fertilizer application. The economic rates of return have been higher than expected, and Malaysia's exports of palm oil have been a very significant source of foreign exchange earnings.

On the negative side, there were several problems. Settling families had difficulty in protecting their crops from wild pig and other animals because of the close inter-relationship of forests and settled lands; attempts to increase revenues from salvage logging in the area prior to settlement, by establishing a sawmill and plywood mill, have not been very successful. Finally, controversy arose over the relatively high cost of the project (US$15 000 per settled family) and the extent to which this type of project is replicable. Lower cost criteria have now been introduced for future World Bank involvement in settlement projects.

To maintain at least part of the remaining tropical forest ecosystem intact, the Malaysian Government in 1976 created an Environmental Ministry and prepared a comprehensive environmental plan for the country, aiming at setting aside more than 1 million ha of forest as permanent biotic reserves and national parks. Of this, 0.5 million ha have already been reserved.

As a model for replication in other countries, the intensive land-use and soil-capability surveys carried out prior to the Malaysia Jengka project are particularly noteworthy. The perennial agricultural tree crops being grown provide an effective soil protection and catchment area cover, and the prospect of sustainable income for the farmers. Such perennial agricultural tree crops already cover about 25 million ha of the world's former tropical forest lands; market prospects for most of these crops are good and further expansion of something in the order of an additional 2 million ha can be expected between now and the turn of the century.

Colombia: Caqueta Settlement Project

In this project, land settlement was spontaneous, less formalized and less successful than in Jengka, and was based mainly on a livestock farming system.

Colonization of the tropical forest areas of Colombia started in Caqueta during the rubber boom, earlier in this century. In the late thirties large numbers of settlers began to move in as word spread that they could take possession of public land and that the area was very well suited for livestock. Government support started in 1959 with a directed settlement scheme organized by Caja Agraria, which failed because of poor selection of settlers and inadequate supervision of credit beneficiaries.

In 1969, the Government of Colombia requested World Bank assistance in development of a continuation of the settlement programme. A loan of US$8 million was made in 1971 for a first-phase Caqueta Project, which was to be developed over three years and administered by a new settlement agency, INCORA. It was to benefit the 8 000 settler families living in the area. The first phase provided long-term livestock loans for 4 500 settlers, construction of 380 km of roads, 90 primary schools, six health centres and improvement of INCORA's administration. Settlement costs were estimated at US$20 million.

In practice, the project suffered from a number of problems including considerable price increases in all fields, unexpectedly difficult physical conditions affecting, in particular, the road construction programme, and lack of participation by settlers in constructing schools under self-help programmes. Toward completion of disbursement, the project design was changed and, in 1975, a second loan was made taking into account difficulties encountered under Phase I. It was concluded when defining the second phase that, while it was premature to observe any improvement of beneficiaries' incomes, the possession of a basic livestock herd had enabled participants to maintain themselves on their current holdings (averaging 85 ha) instead of continued dependence on shifting cultivation. By importing 60 percent of the breeding cattle into Caqueta, the project had "markedly improved the development prospects of an area designed to play a major role in Government's efforts to develop livestock production".

Outstanding problems, such as the lack of technical assistance to farmers, inadequacy of road maintenance, and the provision of social services were to be rectified in the second project phase.

The Caqueta project has been controversial. Kirby, for example, has commented in *Pacific Viewpoint:*

"Not only are most farmers operating a farm unit smaller than that regarded as viable in a beef breeding/fattening economy, but that the tendency toward a bimodal structure is accentuated by the inability of small farmers to buy cattle. Credit is available for the purchase of foundation stock, and, with an inflation rate of more than 20 percent, credit bears a negative rate of interest of 12 percent per annum after a three-year grace period. But new colonists are very wary about credit for cattle purchase, for, if animals die, or are rustled, the loan must still be repaid. Credits for land clearance or pasture are rarely sought since the value of the improved land will be directly dependent on grazing animals not necessarily available to offset its cost. In addition, the Caja de Crédito Agrario has an understandable tendency to lend money to established farmers, where supervision is easier and repayment guaranteed by the collateral security of an existing herd. In summary, the situation in Amazonia is one of very slow improvement in the lives of the new settlers. In 1971, only 55 percent of Medina's sample, in Caqueta and Putumayo, would have stayed on their farm if the possibility existed of their moving elsewhere. For the majority, life is one of shifting cultivation of subsistence crops, living on informal shopkeeper credit."[1]

It would be premature to draw any firm conclusions about the project's possible long term impact on rural incomes. But this project does highlight the major issue concerning planned settlement in the Latin American tropical forest regions — that of the extremely poor quality of some of the forest soils and the difficulties of ensuring sustained livestock and crop production. Much publicity has been given to the degradation of former tropical forest lands in Brazil, caused, for example, by badly managed livestock schemes. By contrast, Sanchez has presented a body of evidence from trials carried out by the Centro Internacional de Agricultura Tropical, Cali, Colombia (CIAT),[2] and other agencies that, given appropriate fertilizer treatment, stocking density and agronomic management, a considerable proportion of the acid latosols of the Amazon region is capable of sustained agricultural crop or livestock production. Several fairly large-scale pilot programmes are under way, the results of which could be highly significant for future development in the Amazon region.

The World Bank's new forestry lending policy stresses watersheds, energy reforestation and smallholder cash-crop tree farming.

Regarding the extent of adequate provision for protecting the forest resources in this settled area, the Caqueta Project experience was an acknowledged failure. At the outset of the project, a deliberate attempt was made to set aside an area of 20 000 ha as a permanent forest reserve, but within a year, despite expenditure on forest guards' housing and protection services, the area was invaded by colonizing families.

To ensure an adequate supply of fuel, building poles and timber for incoming settlers and to maintain the protective role of the forests, the Caqueta Project area which was originally part of an officially declared "Amazon Forest Reserve" was made the target of special resolutions[3] aimed at ensuring that colonization should take into account the need to preserve the forests. The law required recipients of more than 50 ha of public lands to keep 20 percent under forest and it allowed the Government to maintain 10 percent of the area as a protective zone. In practice, the farmers' obligation under this law proved impossible to enforce; the experience on fully developed farms showed that, on average, settlers would maintain not more than five percent of their land under forest for the protection of a spring, or for the supply of housing and fencing wood.

This experience suggests the need for greater flexibility in defining forest laws which decree that an arbitrary percentage of settlement areas should be retained as forest cover, a common feature of land-settlement projects. The Caqueta farmers' decision to protect only five percent of the forest land in order to ensure basic needs for fuelwood and other forest products would seem quite rational in the light of experience elsewhere, which suggests that an average rural family might need something between 250 and 500 trees (less than 0.5 ha) to maintain basic domestic needs. The relevant point is that the main beneficiaries of the various government resolutions aimed at protecting a larger area than this would be farmers situated downstream from the Caqueta Project area, who would benefit from protection of the river head-waters, reduced flooding and sedimentation. These "external" benefits have little relevance to farmers living within the Caqueta Project area, and it is hardly surprising that they should regard the 20 percent restriction primarily as an obstacle standing between them and the possibility of increasing family income by developing additional food cropping areas or acquiring more livestock.

The broader issue raised here is whether, in fact, retention of, say, 20 percent forest cover is the only way to ensure effective catchment area protection. While there is plenty of scientific evidence to show that undisturbed natural forests provide an optimum cover for ensuring adequate soil protection and regulating downstream flow, there is also evidence from many parts of the world, including tropical areas, that other forestry, agriculture and livestock farming systems can also provide adequate catchment protection (see Kenya project below) provided care is taken over soil conservation measures, and livestock numbers are maintained in balance with the carrying capacity of the land. Seen in this light, an alternative approach to designing the Caqueta Project might have placed greater emphasis on soil conservation measures and on the back-up extension services needed to ensure adequate husbandry practices. For protecting forests on very steep slopes and along river banks in the project area, greater flexibility in selecting areas for protection and closer consultation with incoming settlers on this aspect might have produced different results. Recently, the project's forestry component has been revised along these lines and progress is being monitored to assess the impact of these changes in project design.

A second major issue which arose during the formulation of the Caqueta Project, and which has considerable relevance to settlement schemes in other parts of the tropics, was the question of how to increase returns from logging operations prior to settlement. Before 1975, land-clearing operations in Colombia had resulted in the felling and burning of 500 000 ha of forest. At the time of project preparation, clearing was proceeding at the rate of 30 000 ha a year. Every year, it was estimated that 2 million cubic metres of mature timber were being cleared, only one percent of which was sawn and sold, and the rest burned. Of total standing biomass volume of something between 250 and 300 cubic metres per ha, only 25 trees averaging 40 cm diameter or more were suitable for processing into lumber or plywood — and of that, only 17 cubic metres were of species which were marketable. Although a further 30 cubic metres (40 percent) were suitable for charcoal burning and fuelwood production, they could not be used for this purpose because both local and nearest potential export markets were saturated. After intensive study of this issue, it was concluded:

"It is considered quite impractical, if not impossible, to rationalize felling

INDONESIAN WOMEN AT

five hectares

at the present stage of development of the Caqueta Project. Whatever benefits could be obtained from a rationalized forest exploitation should be weighed against the delays it would cause in developing the area through spontaneous colonization. The studies carried out show that, under these conditions, rationalized forest exploitation would not be economic".

ANSMIGRATION PROJECT

d per family

Kenya: the taungya system

Kenya's plantation forestry programme has a number of features of general interest including the role which plantations could play in reducing pressure on the natural forest ecosystem; the provision for the setting aside of specified nature reserves; the fact that some of the past shift in land use from forestry to agriculture was based on systematic long term catchment area studies of the likely impact of different cropping patterns on stream flow and downstream agriculture.

Kenya's forests cover about 2.5 million ha (about four percent) of the country's total area (16 percent of the land area receiving more than 850 mm of rainfall). Over the past 50 years, the indigenous forest has been continuously exploited for the production of sawntimber and other forest products. Because natural regeneration of indigenous forest species takes between 60 and 100 years to produce timber of usable size, the Government, over the last 30 years, has been replacing some of these forests with faster growing exotic softwood plantations. To date, a total of about 160 000 ha of industrial plantations have been established, representing seven percent of the total forest area.

In 1969, the World Bank made a loan of US$2.6 million to finance part of the costs of a six-year time-slice of this plantation development programme. The aim was to establish 28 000 ha of plantations during this period and it was successful in meeting the target. In 1976, a second loan of US$10 million financed the continuation and expansion to cover the whole of the industrial plantation programme of the Forestry Department. This project is due for completion in 1980 and a third phase will, simultaneously, concern rural afforestation and industrial capacity needs for processing the expanding raw material base.

Most of Kenya's afforestation programme has been carried out using the "taungya" system. In Kenya, forestry workers grow mainly maize, beans or potatoes for a period of four or five years, after which the plantation is grown on as a monoculture forestry crop until ready for harvesting. Pines and Mexican cypress were the main species used.

With respect to the three main criteria used in this paper the project can be regarded as successful. The forestry plantation programme provides sustained employment for some 5 000 persons. Kenya's forest villages, more than 100 of which have been established over the last 30 years, sustain stable forest communities dependent on a combination of agriculture and forestry work for their livelihood. Many of the forestry workers are second-generation forest villagers. As the forestry programme has proceeded, secondary employment opportunities have been generated in logging, sawmilling, pulp and paper and furniture factories.

The new forestry plantations have a wood productivity some 15 times greater than that of the indigenous forest which they are replacing. The deep volcanic soils on which the plantations are being established are capable of sustained cropping, although recent research work suggests some fertilizer application may prove necessary between rotations.

Two points of general interest arise from this project experience. The first is the role which such compensatory plantations can play in relieving the pressure on indigenous catchment protection forests. It is from the 2.4 million ha of indigenous forest that most of Kenya's important rivers and streams originate. Prior to the fifties, more than 90 percent of timber production came from these indigenous forests. Timber-concession licences had been allocated under long-term contract arrangements covering most of the accessible forest area. Today, in 1980, the compensatory plantations which have been established in Kenya — and cover less than 10 percent of the former indigenous forest area — are supplying more than 80 percent of Kenya's industrial wood demands for both domestic consumption and export. The net effect has been to reduce the intensity of exploitation in the remaining 2 million ha of indigenous forest, the primary function of which remains that of catchment protection.

The second point is that, as part and parcel of this overall forestry development programme, the Kenya Forestry Department, some 20 years ago, established 43 000 ha of nature (biotic) reserves. In the second forestry project financed in 1976, one condition of the loan was that these reserves would be extended by a further 7 000 ha, so that they would become fully representative of Kenya's biological and botanical ecosystems. This was done.

A third point of general interest relates to Kenya's enlightened land-use policies in the area of forestry. Because of intense population growth and the fact that much of the forest is situated on soils of high agricultural potential, the indigenous forest areas have always been under pressure for agricultural settlement. In the fifties, a series of long-term comparative catchment area studies was carried out by EAFFRO[4] to compare the impact on stream flow, soil erosion and

Some observations about agricult

Because of uncertainties in some of the traditional smallholding cocoa-producing countries, cocoa cultivation is becoming geographically more widely distributed and is increasingly being grown on a plantation basis, either as a monoculture or under coconuts. In Malaysia, the traditional tree fruits may follow a similar course and black pepper is also seen as a target for the specialist-producer.

This trend cuts right across the emphasis in current international forestry literature on the potential for "agri-forestry", that is, simultaneous intercropping of trees and food crops. It is important, therefore, to clarify the difference between these monoculture farming and forestry systems and the integrated food and tree inter-cropping farming systems practised, for example, by small farmers in Java, in the Kerala region of India, in Sri Lanka (the Kandy Garden System), and so on. The very small farmer of the humid tropics with less than two hectares of land, typically grows a variety of food and cash crops around and near his house. In Java, the farmer is highly skilled and cultivates rice, cassava, maize, beans, groundnuts and vegetables in association with bananas, plantains, citrus, cloves, cinnamon, pepper, coffee, cocoa and a variety of tree fruits, all under a thin stand of coconuts.

The homestead tree lot, so typical of the humid tropics, reaches its highest expression in Sri Lanka, where the "tree gardens" round Kandy present a complex association of cassava, bananas, ginger, plantains and others under a mixed stand of tree fruits, coffee, cocoa, pepper, cinnamon, cloves, areca palm and coconuts. In West Africa, this sector is represented and vegetables are grown in association with a mixed stand of coffee, cocoa, tree fruits, kola and oil palm.

These small-farmer systems contrast sharply with the simplicity of monocropped agriculture and forestry plantations and by comparison would be more difficult to modify and improve. Improvement of smallholdings such as those in Java and Nigeria may only be possible by the provision of better planting material over an extended period of time, but a catalytic effect might be achieved by better roads and marketing facilities. These would stimulate the larger and more progressive farmers into modifying their cropping systems to take advantage of the better circumstances, but for the very small subsistence farmer, the element downstream sedimentation of alternative land-use systems, including natural forest in an undisturbed state, plantation forestry, tea plantations, livestock and intensive food cropping. It was clearly established, given appropriate soil conservation measures, planting spacement and other husbandry techniques, that tea, for example, could provide an effective catchment cover without adversely affecting downstream flow and sedimentation. This long-term experiment was used as a basis for a deliberate decision by the Government of Kenya to excise some 10 000 ha of forest land in the southwest Mau Forest for subsequent tea production. Tea exports have now grown to be Kenya's second largest export earner after coffee, generating foreign exchange earnings which account for 25 percent of agricultural exports and 10 percent of total exports. Most of the tea industry which has enabled some 20 000 farmers to move from a subsistence to a cash-crop farming system is located on what used to be indigenous forest land.

Indonesia: Transmigration II

The Indonesia Transmigration Project, as the Colombian Caqueta Project, concerns the settling of small farmers on acid tropical forest latosols. In Indonesia, the emphasis is on arable crops, whereas in Colombia it is on livestock.

As part of a long-term transmigration programme, the Government of Indonesia requested World Bank assistance in 1973 for a project to help resettle incoming families from Java and Bali on four sites along the trans-Sumatra highway in the Province of Jambi and to upgrade the standards of living of existing families already settled at a site in the same area.

The Indonesia Transmigration scheme is one of the largest resettlement programmes in the world. Since 1905, successive governments have sponsored the migration of poor farmers from the overcrowded islands to relatively under-utilized neighbouring islands, particularly Sumatra. All told, government programmes have transferred nearly a million settlers, and an estimated 2 million Javanese residing in the Outer Islands are there as a direct result of government resettlement and associated population growth. Much of the earlier settlement provided workers for rubber estates in Sumatra.

In January 1974, FAO undertook a study to identify a possible transmigration project suitable for external assistance, and in 1976, based on the results of this study, the World Bank undertook a first-phase transmigration project intended to upgrade the living standards of 12 000 settled families and to establish a new community for

ral plantations and agri-silviculture

of risk could still be too high to permit change; under these circumstances, some degree of land consolidation and cooperative farming might be essential before improved cropping systems could be introduced.

As a broad conclusion, it seems that the "agri-forestry" farming systems used by small farmers in Java and elsewhere in the humid tropics are well proven and provide a diversified combination of subsistence, food and cash crops which reduce the risks of starvation and, at the same time, offer some small surplus cash income. However, it seems possible that where small farmers have room to manoeuvre and expand the scope of their cash-cropping operations, the trend is likely to be toward monoculture rather than away from it. In other words, in the humid tropics agri-forestry combinations may not always prove to be the most productive small farms.

The distinction between monoculture and intercropping (agri-forestry) farming systems deserves attention because recently there has been a tendency for foresters to jump on the agri-forestry bandwagon and promote indiscriminately agri-forestry systems in all areas of forestry development as a means of increasing the productivity of tropical forest lands. A more selective approach seems to be warranted with emphasis on those small farming systems or phases of development in plantation forestry where intercropping of food and tree crops can be of definite technical and economic benefit.

An associated issue is this: if we take a closer look at the potential for introducing agri-forestry in the humid tropics outside the well-established taungya plantation model and study the cropping pattern being used in such places as Java, Kerala, and Sri Lanka, we find that most of the trees which are being grown are fruit trees or horticultural crops which traditionally have fallen outside the foresters' province. Clearly, if foresters are to play a more active role in this area, we need to broaden our knowledge of the range of tree crops which can be used in forestry and to work in closer association with tropical agronomists who are familiar with such crops. We will also have to accept that this is an area in which the forester may often have to play a supporting role to the agronomist and agricultural economist rather than the converse. Investment in traditional forest tree crops will frequently, but not always, be a relatively low proportion of the cropped area and of farm investment costs.

4 500 new settlers. New migrants were provided with five ha of land, of which 0.5 ha was already cleared and 1.0 ha already planted to immature rubber. A second-phase project is now in progress, building on the experiences gained. A smaller farm size (3.5 ha) is being adopted.

The most controversial issue has been the question of the sustainability of the cropping pattern, taking into consideration the highly acid nature of the forest latosols, deficient in nitrogen and phosphorus and possibly low in potassium. Earlier research showed that soil structure is favourable to plant root formation and that by adding regular fertilizer inputs some of the forest soils would become suitable for upland food crop production. To combat the high phosphate fixation, the initial phosphate application should be heavy. Nevertheless, no technical package involving a high degree of dependence on annual food crops has yet been proved over a long period of time.

The cropping pattern originally envisaged under the project allocated 3.5 ha of land per family, of which two ha were for food cropping and about 1.5 ha for tree crops (mainly rubber), the latter to be grown as a monoculture. Land clearing was to be carried out by a combination of mechanical and hand methods and 500 kg per ha of rock phosphate harrowed into the soil just prior to settlement. The main food crops to be grown were rice, maize and cassava and it was assumed that settlers would establish house gardens containing vegetables and tree crops such as coconuts, cloves, coffee and bananas and different fruit trees. Special provision was made in project design for ensuring that farmers would have adequate supplies of fertilizer, that there would be a framework for close coordination of the various government agencies involved in providing extension support, and that seed and planting materials would be readily available for the farmers as and when needed. A staffing ratio of one agricultural extension worker per 500 families was planned (higher than in similar projects elsewhere), as well as a strong emphasis on training.

Despite these provisions, a recent review of project progress has highlighted the fact that incoming settlers are having difficulty in producing enough food crops to ensure subsistence and in securing the necessary inputs, such as fertilizer and improved seeds.

The key policy issue is whether there is any practical alternative to forest settlement in Indonesia in the light of increasing population pressure on the limited areas of good soil. The "alang-alang" grassland[5] areas and the "Cerrado" region in Brazil, for example, could in theory provide a short-term alternative to continued forest settlement and allow more time needed to develop sustainable farming systems for the tropical forest latosols. However, in practice, a sustainable farming system for the "alang-alang" grasslands has not been developed. The scope for more intensive research in this area is a matter of high priority.

The question has sometimes been raised by environmental and other agencies as to why the World Bank supports such settlement projects in situations where there are significant ecological risks? Part of the answer is that spontaneous settlement as a result of population pressure is a fact of life in many tropical situations, has been going on for many years and in some cases is beyond government control.

By actively working toward improvement of existing farming systems, upgrading of extension services, assurance of a ready supply of agriculture inputs, and supporting more intensive agricultural research, the chances of preventing ecological degradation should be enhanced. The alternative — allowing spontaneous settlement to proceed unchecked — would leave farmers with inadequate inputs, and without extension services, roads, social services and marketing and other facilities.

As was noted earlier when dealing with the Malaysia Jengka project, it seems important to keep in perspective the fact that part of the remaining tropical forest ecosystems could be put to more productive and sustainable land use, for example, by converting it to perennial agricultural tree crops and thereby providing thousands of small farmers with a viable alternative to shifting cultivation.

Philippines: a smallholder tree-farming project

The unique feature of this smallholder tree-farming project is that, with the exception of a project in Gujarat State, India, it is the only one financed by the World Bank, to date, where small farmers are growing forest trees as a cash crop. This is a second-phase project and it has two main components: smallholder tree-farming through a supervised credit scheme operated by the Development Bank of the Philippines; and pine plantation development by the Bureau of Forest Development.

The smallholder tree-farming component is encouraging farmers on marginal agricultural lands throughout the country to take up tree farming (associated with food crop production) for establishment of firewood, charcoal, pulpwood and leaf-meal plantations. The project is innovative and experimental and is based on the Bank's experience of an earlier US$2 million pilot project which provided funds for the development of pulpwood resources around the PICOP Pulp Mill. The first-phase pilot project was successful and has led to a quantified and readily perceivable improvement in the participating farmers' income and way of life.

Under the second-phase project, out of 28 000 ha of tree-farm development to be financed, 10 000 ha will be located in Mindanao, 5 000 in Visayas and 8 000 ha in the Ilocos region of northern Luzon. Tree-farm size ranges from two to 15 ha. Fuelwood and charcoal plantations, which account for a high proportion of project farms, average about five ha.

In relation to the likely impact of the project on rural incomes, experience under the Philippines I Project is well documented and it would seem reasonable to anticipate sustainable net revenues of something between US$78 and US$100 per ha from tree farms of *Albizia* producing pulpwood, something in the order of US$140 per ha for tree farms producing fuelwood and charcoal, and US$300 per ha for farms producing leaf meal (based on Giant *Ipil-ipil*).

The financial rates of return to farmers are high and the project's economic rate of return is something in the order of 23 percent. The second project is experiencing difficulties related to land-tenure constraints, and the need for greater flexibility in this area is under review.

As for ensuring that forests are protected, the most interesting feature of the Philippines smallholder tree-farming experience is that it is mobilizing shifting cultivators in the re-establishment of forest cover in formerly degraded catchment areas. The profit incentive of tree farming is helping to encourage reforestation of eroded catchments.

Despite the obvious attraction of this formula, there are limitations to its wider application. One of the main problem areas in planning for expansion of the first-phase project proved to be the economic radius for haulage for pulpwood. Smallholder tree farmers situated outside a 100-km radius from the mill were excluded because of the transportation cost factor. Projects of this type are particularly suitable for establishment of plantations around a central processing plant (whether for the production of pulp, charcoal, power generation, alcohol, lumber or leaf meal) where there is a guaranteed market price for wood. But all of these different industries have upper limits of delivered wood cost beyond which it is not possible, profitably, to process the raw material. In other words, they are primarily suitable for concentrated resource development within the command area of a processing plant. For this reason, this approach could not be adopted as a "blanket" solution for all proposed forest areas in which shifting cultivation is a serious problem.

The scope for extension of the Philippines experience to other countries is, nevertheless, considerable and the World Bank is reviewing prospects for helping some of its other member countries to undertake similar schemes.

One of the most effective ways to slow down the rate of tropical forest destruction is to attack the root cause of the problem - rural poverty. If we continue to depend only on exhortations to logging companies, multinational corporations and developing-country governments to "stop tropical deforestation", it is my own personal view that we will be no more successful in arresting the pace of forestry destruction than was King Canute in trying to stop the advancing waves by using equally futile tactics. A deliberate shift in conservation strategy is needed to focus more on positive approaches to rural development and alleviation of rural poverty, if we are to preserve effectively what is left of the tropical forest ecosystems.

To save the tropical forests from further depletion the focus should be more on how to improve the incomes and quality of life of the 200 million who practise shifting cultivation throughout these forests.

I have attempted to show that a considerable part of the so-called "forest destruction" taking place in the developing world is, in fact, a logical shift in land use to more productive crop or farming systems. Provided that these are adequately supported with technical extension, agricultural inputs and other resources, land-settlement projects can provide a sustainable land-use alternative to retention of the land under virgin forest cover. There seems to be convincing evidence that many of the agriculture and rural development projects already initiated in tropical forest areas have resulted in a quantifiable increase in rural incomes; have enabled the small farmers involved to settle in more stable communities; and have eliminated their former dependence on shifting cultivation. In other words, settlement of small farmers and forest protection need not be mutually exclusive objectives.

In some of the projects undertaken in the past in which land-use and soil-capability surveys were carefully carried out in advance of settlement, and agricultural development channelled into the flatter lands, it has proved possible to exclude a large part of the remaining forest from agricultural settlement and this has remained unexploited (Malaysia, Jengka). In other cases, inadequacy of forward planning, or too high a degree of dependence on non-enforceable forestry protection legislation, has failed to protect the forest. This means that project design must be flexible and take into account the needs and aspirations of incoming settlers or small farmers (Colombia, Caqueta).

Because of the wide variation of tropical forest soils, climatic and physical conditions, it is impossible to generalize about appropriate farming systems for tropical forest areas, but what seems to emerge from this analysis is that perennial agricultural tree crops such as oil palm, coffee, rubber, cocoa, tea and coconut can be an ecologically sound alternative to natural forest management and, secondly, that whatever agricultural crop or livestock or forest plantation crop combinations are envisaged, the capacity of governments to ensure adequate support services, inputs, such as fertilizer and seeds, agricultural research services, feeder roads, social infrastructure and marketing outlets constitute a decisive factor in determining whether a particular farming system is sustainable. Even in the most intractable soils, such as those of the Amazon, evidence suggests that, given appropriate attention to soil conservation measures and crop husbandry techniques, it may prove possible to sustain arable, and even livestock farming, systems on at least the better endowed of these low-fertility soils where, in the past, all such attempts have failed.

Because market constraints for plantation-grown agricultural and forest tree crops will probably limit their development to something less than 10 percent of the remaining tropical forest ecosystems between now and the turn of the century, high priority should be given to agricultural research and to pilot-scale development programmes aimed at improving the present state of knowledge of sustainable food cropping systems as an alternative to shifting agriculture and, in the interim, directing settlement to better soils.

In watershed areas, an integrated rural or "area" development approach which offers the small farmer an alternative to his ecologically destructive way of life can help to preserve the remaining forest and, thereby, reduce the risk of soil erosion and downstream flooding. Investment in such infrastructural "inputs" as a supply of seeds and fertilizers, torrent-control structures, soil-conservation measures, provision of credit, training of extension staff, feeder roads, marketing services, schools, shops, hospitals and other social services is the quickest and most certain way to ensure that farmers abandon shifting cultivation and adopt a more sustainable farming system. Some agricultural and livestock farming systems with appropriate husbandry practices can also provide effective catchment protection. In other words, forestry is not the only solution.

It is clear that compensatory forest plantations have an important role to play in ensuring protection of part of the remaining tropical forest ecosystem because they can provide an alternative source of timber and take the pressure off further exploitation of indigenous resources. Reforestation programmes in the developing countries are currently proceeding at less than 20 percent of the rate needed to ensure domestic self-sufficiency by the year 2000 and a massive increase in the annual rate of establishment of fast-growing species is called for before smallholder tree-farming can play a significant role in situations where the forest lands or catchment areas to be protected are situated within an economic haulage distance of a processing plant or cash market.

Concerning the problem of the preservation of biotic reserves, the environmental agencies of the world have done a masterly job in alerting international awareness on this matter. It is becoming widely accepted that the arguments in favour of preservation of forest-dwelling hunter/gatherers, wildlife, botanical genetic resources and potential future drug and medicinal plants are irrefutable and the governments of some developing countries (e.g., Malaysia and Kenya) have expressed their willingness to increase efforts to protect such resources and have created environmental agencies. But the only certain way we have of ensuring that these designated biotic preserves will be protected in practice is by increasing support for rural and agricultural development programmes in adjacent areas.

Foresters might regard some of the projects described here as agriculture rather than forestry projects, and it is precisely at that point that problems can arise. Foresters in the past, have tended to be highly parochial about defining what constitutes a forestry project and to assume that their responsibility starts and ends with the cultivation of forest trees in forest reserves. In fact, forestry investments are likely to comprise a relatively small proportion of many of the rural and agricultural development projects which will be needed to bring the current process of tropical deforestation under effective control. In the area of catchment and agri-forestry, in particular, foresters will have to be prepared to work more closely with agricultural settlement and other agencies, playing a complementary and supporting, rather than a predominant, role in the development process.

Concerning the World Bank's role in forestry projects, we are conscious of the fact that the Bank's efforts in this area can only be marginal and that the main impetus must come from within the developing countries themselves. Following publication of a Bank Forestry Sector Policy Paper in 1978, the Bank made a major shift in emphasis of forestry lending toward environmental and rural forestry, and set as a goal a five-fold increase in the level of forestry lending to achieve a target of US$500 million within the five-year period 1979-83. The response of the developing countries' forestry services has been encouraging. Since 1978 we have made loans to forestry projects in about 35 different countries, and more than 60 percent of these have been for programmes aimed at environmental protection and provision of fuelwood, fodder, building poles and other forest products needed both for basic subsistence and development. The US$500 million lending target has been achieved somewhat ahead of schedule.

In future forestry lending, we intend to give special emphasis to watershed protection, renewable energy-related reforestation programmes with fast-growing species, and to smallholder cash-crop tree farming in rural areas. Of the US$3 thousand million a year which the Bank is currently lending for agriculture and rural development, part will continue to be directed toward agricultural settlement and watershed protection. Although primarily aimed at reducing rural poverty, such settlement projects should make a contribution to preserving part of what remains of the world's tropical forest ecosystem. ■

Footnotes

1. See "Land use in Amazonia." *Pacific Viewpoint* (19), 1978.
2. See *Pasture production in acid soils in the tropics.* CIAT, 1978.
3. See Nos. 015 of 1963, 141 of 1964 and 216 of 1965; and articles 14 and 15 of Special Decree 2278 of 1953.
4. East African Agriculture and Forestry Research Organization located in Nairobi, Kenya.
5. Forest lands formerly under shifting cultivation now abandoned and which have reverted to a coarse grassland.

SESSION XXXII

Exercise I Lecture on Agro-Forestry

Total Time: 2 hours

Overview

This new discipline in forestry is introduced and the concepts of agro-forestry as related to the Peace Corps Volunteer are presented. It is pointed out that this field, although not entirely new, is new in academic instruction of forestry as a sub-discipline, and as such there has not been many books written on the subject at this point in time. Perhaps those authors are present here as participants in this session.

Procedures

Time	Activities
	1. Agro-forestry lecture: The following is an outline used by Bill Prentice, Agro-forester in the Amazon Basin of Ecuador. We present it along with his lecture as a guide for doing this important session.

SESSION XXXII

Lecture: Agro Forestry

AGRO FORESTRY: A Possible Marriage

Page 1 (on newsprint)

"Some ideas on integrated land usage"

William E. Prentice, Puerto Napo, Napo, Ecuador

Page 2

We believe that it is right for a man to strive to better the world in which he lives.

How?

Each tree you plant makes the world a better place.

As a PCV, you can have a great multiplier effect by teaching others to plant and care for trees.

Page 3

I. Combining "forestry" with agriculture and livestock.

- Possible combinations,
- Why do it?
- Overcoming resistance.

II. Selecting the Crops, Horticultural Trees and Animals.

- Animals,
- Fruit and nut trees,
- The birds and the bees,
- Fowl play

Page 4

Land usage: Production techniques

Forestry, Agro-Silvicultural, Silvo-Pastoral, Agro-Silvo-Pastoral, Agriculture, Livestock, Agro-Pastoral.

Land usage-various possibilities

Agricultural - Field Crop Monoculture

- Orchard monoculture
- Mixed cropping
- Polycultures

Forestry

- Reservations
- Conservation
- Plantation - single species
- Plantation - mixed species

Livestock

- Ranging
- Pasturage of paddocking
- Confinement
- Forage and feed storage

Agro-Silvicultural

Animal under trees; regular distribution

- In relay sequence
- Permanent association

Animal under trees; irregular distribution,

Horticultural tree with forest trees.

Agro-Pastoral

- Grazing under trees (fruit and nuts)
- Grazing plant residues
- Fowl with resistant crops
- Pigs and fowl (self-harvesting)

Silvo-Pastoral

- Grazing under trees
- Planted forage
- For weed control

Agro-Silvo-Pastoral

- Annual + trees + animals
- Perennials + trees + animals
- Annuals + perennials + trees + animals

Page 6

Why combine forestry and agriculture?

For greater and sustained production.

1. Economics
   - greater income potential
   - quicker income
   - lessened risk

2. Ecological factors
   - macro-ecology
   - erosion control
   - watershed improvement
   - aesthetic and recreational value

3. Agricultural reasons
   - soil enrichment both chemical and structural
   - shade
   - vertical integration for better utilization of space
   - reduced proliferation of pests and disease
   - more even distribution of work load

4. Subsistence motive

Can feed one's family from the same land that is in tree production.

Page 7

Why does the small farmer resist planting trees?

1. No tradition of planting trees,
2. Accustomed to short range thinking,
3. Little investment capital - hand to mouth poverty,
4. Ignorance of the very good reasons why we should plant trees,
5. Very little suport for tree planting;
   a. Lack of investigation on what species with which to plan possible integrated production techniques,
   b. Compare tree planting with other land uses; often the tree planting requires less capital and may be just as quick an income producer,
   c. Trees are security for old age. Do the hard work while one is young and strong,
   d. Few people plant trees but those who do can expect a good return.

Personally

1. Make reference to the children: "In five years the baby will be in school. If you plant __ trees now, they will pay for his school expenses."

2. Expected life span

   "Hasta esto me muero!"

3. What provision does he have for his old age?

GET PERSONAL

Page 9

Selecting the crops, horticultural trees and animals.

Annual Crops

Cereals and pulses (legume crops like beans). Can the small farmer compete with machines? Vegetables, fruits and specialities. Labor intensive crops, when land is limited.

Lowlands		Harvest	
Pineapple	moderate shade tolerant	18 months	Heavy feeder
Passion fruit	" " "	12 months	Let fruit drop
Black Pepper	" " "	18 months	Labor int. harvest
Papaya	Full Sun	9 months	Diff. to estab.
Plantain	Full Sun	8 months	Suspt. to nematodes
Tree Tomato	Shade Tolerant	12 months	Needs pampering
Naranjilla	Shade Tolerant	8 months	Needs pampering

Page 10

FRUIT AND NUT TREES

Name	Time to Harvest	Tree Size	Use	Management 1 to 5
Achiote	2 Years	Small	Red Dye	5
Cacao	3 years	Small	Chocolate	3
Cafe	2 years	Small	Coffee	3
Coconut	5 years	Medium	Nuts raw mat.	4
Citrus	2-3 grafted	Sm -Med	Fruits	2-3
Guaba Inge	4 years	Med-Lrg	Fruit, wood feed	
Guauaba Psidium	3 - 4 years	Small	Food, Medicine Feed	4-5
Frutipan Autocorpus Anona	5 years	Large	Food, Medicine	

FRUIT AND NUT TREES (Continued)

Name	Time to Harvest	Tree Size	Use	Management 1 to 5
Frutipan (Continued)			Feed	4-5
Guariabana	4 - 5 years	Sm or Med	Fruit (High Value)	3
Chonta Guileria Gaspides	5 years	Medium	Fruit, Palm hearts, wood	4

Page 11

1. Make a list of possible crops to choose from and learn about each one,
2. Seek out local expertise and experience,
3. Do not jump to conclusions,
4. If the crop needs pampering in your area leave it alone,
5. Shade tolerance is related to soil fertility,
6. Grow what you like to grow.

Exercise II Agro-Forestry Plans

Total time: 2 hours

Overview

In this exercise trainees' plans are critiqued. Based on lecture in the morning, realistic plans are discussed by trainer with each trainee. Suggestions are given to trainees for possible future use of plan or parts of plan.

Procedures

Time	Activities
	1. Trainees are divided into groups according similarity of climatic conditions at their future work sites. Trainers return site plans to trainees with notes and they are discussed by trainer (the reason for doing this in groups is that each trainee has something to contribute). Some of the agroforestry papers recieved during pilot program are enclosed here for samples.

Trainer's Note: It is important that each trainee discuss his/her paper and that trainer responds to it. This may require a second round in the afternoon and possibly the evening.

AGROFORESTRY

(for Southern Manabi)

One of the biggest problems the province of Manabi as a whole faces is one of lack of water. For agriculture, most areas must use irrigation. There are some areas that do not even have a permanent water source. In these areas agriculture is impossible and the focus here is to plant trees to control soil erosion, for forage and wood and especially for firewood and charcoal.

In those areas where irrigation is needed and possible, an agroforestry program can get more use from irrigating the same area. A profitable crop and a usable tree can be planted together and they will receive twice the benefits.

There are many different schemes possible:

One example might be using Tamarindo with Sandia. Tamarindo is becoming more scarce and an effort is being made to plant more. Although not extremely drought resistant, it is being planted in the drier regions.

Tamarindo produces a fruit which is marketable, the flowers and leaves can be used for seasoning, varnish can be extracted from the seeds, and the bark produces chemicals for the tanning of skins. Overall it is a fairly profitable tree. Tamarindo requires fairly good soils, deep and well aerated. It also prefers flat areas over slopes. It grows to about 12 meters in height and provides a lot of shade.

Tamarindo should be transplanted to a plantation when the plant is 50 - 60cm tall. Pots are utilized in the nursery.

The spacing of Tamarindo is 8x8 meters or possibly 10x10 meters.

A second crop can be planted between the rows - Sandia has been suggested as a second crop to use. In this way the farmer has two marketable crops available.

One of the drawbacks of this plan is the fact that for two years no other crop can be planted and the farmer has no income from that area for two years.

Other possibilities for agroforestry in the Province of Manabi include the planting of legumes, acacias with crops. They have deep root systems and many fix nitrogen which would improve the secondary crop.

Another example is the algarrobo (Prosopis jutiflora) which has been planted with corn in the first year. After that, the algarrobo takes over and the corn cannot compete for nutrients and hence does not survive. This is a good system if the landowner wants to plant algarrobo for use as forage. In this way until the trees become large enough to be used for forage, the area can be used to produce corn. Algarrobo is a good tree to plant because the leaves and the seed can be used for forage by animals. The seeds can be stored and used during the extremely dry seasons as food for the animals and the wood makes excellent firewood.

For plantation purposes it shoud be planted at 15x15 meters or at 10x10 meter intervals.

Peace Corps Volunteer Anne Wagner
contributed this article.

AN AGRO-FORESTRY PLAN FOR THE AREA AROUND QUININDE, ECUADOR

Agro-forestry is a production system that suplies wood, agricultural crops, and/or animal products from a single management unit. In a productive agro-forestry system, good agricultural practices are combined with the efficient use of trees.

A multitude of factors must be considered when planning an agro-forestry system. Primary consideration must be given to the area's climate, topography, soil fertility, land tenure, proximity to markets, and present and future population pressures. The agro-forestry plan should also include methods for soil and water conservation and techniques for producing food and wood during the entire year if possible.

Crops selected for use should be diversified to reduce the risk of infestation by insects or disease. Chosen crops should have relatively low nutrient requirements and be easily stored. An emphasis should be placed on the production of animal protein from plant products and forage that are of no direct use to man, (i.e., leaves, etc).

In tropical rainforest ecosystems, trees are critical to the stability of the landscape. Trees are necessary in nutrient cycling because rainwater percolating during wet seasons deposits soil nutrients at a depth that only tree roots can reach. Thus, over time, trees can rejuvenate a soil that has been badly drained of its nutrients.

Today in many parts of the tropics man is producing crops on land better suited for tree cover. An agro-forestry system can remain productive throughout the entire year, resist infestation of parasites, and disease, maintain the quality of the soil and minimize soil erosion.

The micro-climate contained within the tropical agro-foresty system are modified by tree cover, and minerals and nutrients can be recycled by natural processes that utilize organic matter from living or dead tropical plants, and manure from livestock. Thus, a tropical agro-forestry system, besides conserving the tropical ecosystem, could potentially yield: seeds, flowers, fruits, vegetables, leaves, medicines, resins, forage, firewood, lumber and meat.

My plan for an agro-foerstry system is based on the tropical rainforest area around Quininde, a town in Esmeraldas province in northwest Ecuador. Quininde receives over 80 inches of rain annually with a heavy rain season lasting from February through April. While still containing much valuable timber, the rainforests surrounding Quininde are being rapidly stripped. Very little forestation is taking place.

The major cash crops grown around the Quininde area are coffee, cocoa, bananas and rice. Oranges, pineapples and grapefruit are also grown. Many of the large haciendas in the area utilize a great amount of land for cattle grazing. There are large haciendas of 500 to 1000 hectares as well as many small family farms of 5 to 10 hectares.

My purpose is to introduce the use of TECA (Tectona grandis) and Laurel (cordia alliodora), as companion species of timber to areas of coffee and cocoa production, as well as on pasture land.

Both Teca and Laurel are common timber species growing naturally in the Quininde area at this time. Both species produce very high quality, marketable timber. Their woods are used for doors, windows, furniture, boat decking, flooring and paneling.

Both species grow rapidly. Teca can reach 6 meters at two years, 10 meters at four years, and 15 meters at ten years of age. Both Teca and Laurel grow in wet soils, which are also suitable for coffee and cocoa.

Laurel has previously been shown to provide good shade for coffee and cocoa while simultaneously providing a good source of timer. Peter Weaver, in agri-silviculture in Tropical America, reported the natural regeneration of Cordia alliodora in a coffee plantation at Chinchona, Colombia. At maturity, the trees had a basal area of 20-30 $m^2/_{ha}$.

I have observed Teca growing very well on coffee and cocoa plantations near Quininde. Given Teca's enormous leaves, it should be a reasonabley good shade tree. I suggest using both Teca and Laurel in the agro-forestry system in order to prevent a single infestation of disease or parasites from destroying all of the trees present.

Thus, I would suggest to farmers in the Quininde area that they attempt to intercrop regularly Teca and Laurel with their stands of coffee and cocoa. It may also be possible, depending upon the distance between trees, and the crop species involved, to intercrop Teca and Laurel with other shade-tolerant crops. By helping to recycle minerals and nutrients in the tropical soil, the introduction of Teca and Laurel could increase crop yields.

Teca and Laurel forage could be used as animal feed and/or green manure. By scattering trees on pasture land, livestock would have more shaded areas and forage material available. The use of Teca and Laurel as "living fence posts" around pastures woud enclose livestock, providing forage and shade and decrease the necessity for cutting small trees as replacement for fence posts. There is a great deal of pasture land in the Quininde area.

The litterfall fo Teca and Laurel would add nutrients to the soil and could be used to fertilize family garden plots. Their presence would certainly help reduce soil erosion, which is now a very serious problem in the Quininde area due to the large numbers of trees being cut for timber and agricultural purposes.

For this system to be accepted by the campesinos in and around Quininde, a great deal of extension work will be needed to convince the people of the potential benefits. However, given the extensive timber market in the Quininde area, tree cropping with lucrative timber species should not be overly difficult to promote.

Existing cooperatives would have to be organized so that the entire cooperative is involved in the agro-forestry system. It might be beneficial to start new cooperatives as a means of developing agro-forestry on a community-wide basis. Nurseries should be developed in cooperatives or communities that are utilizing an agro-forestry system, so that the campesinos will have a permanent supply of seedlings and will learn more about forestry.

Special cases may require a great deal of expensive resources in order to maintain an agro-forestry system. For example, expensive fungicides may be needed to fight fungi that are invading a nursery or a stand of trees. Thus, it is important to consider possible lines of credit or other forms of aid that are available to rural farmers.

Peace Corps Volunteer Daniel Saxon
contributed this article.

SESSION XXXIII

Spanish Language

Total Time: 1½ hours

Overview

During preceeding session, agro-forestry concepts have been discussed. It is important that trainees be able to discuss these concepts in Spanish. This language session is devoted to articulation of agro-forestry concepts.

Procedures

Time — Activities

1. Using vocabulary, trainees discuss agro-forestry concepts they have learned in previous session. It is important that trainees be able to articulate these concepts in simple terms because they will later have to do this as extensionists.

Vocabulary

Agro-forestry system - sistema agroforestal
Agro-silviculture - agro silvicultura
Agro-pastoral - agro-pastoril
Multiple use - uso multiple
Crop - cultivo
Crop rotation - rotación de cultivos
Environment - ambiente
Polyculture - policultura
Bush - ambusto
To grow - creyer
Overgrazing - pastureo excesivo
Sustained production - producción sostenida
Sketch, rough draft - bosquejo
Sketch - croquis
Brush, thicket - matorral
Integrated management - manejo integrado
Survival - supervivencia
Habitat - habitat
Shifting agriculture - agricultura nomada
Loan - prestamo
Branch office - sucursal
Once in a while - de vel en cuando
Coffee - cafe
Banana - banano (plant
Coco - cacao
Pasture - pasto, pradera
Grass - pasto
Prickley pear - tuna
Tuna - atún
Lime - cal (mineral)

Vocabulary (Continued)

Lime - lima (fruit)
Lemon - limón
Orange - naranjo (tree)
Cherry tree - cerezo capuli (Ecuador)
Drop - gota
Turkey - pavo
Sweet potatoes - camote
Fir tree - abeto

SESSION XXXIV

Lesson Plan and Use of Visual Aids in Teaching

Slide Presentations

Total Time:

Goals:

- To instruct trainees in procedures for presenting lesson of charlas;
- For trainees to practice setting up simple lesson plans to demonstrate to group;
- To discuss method for making and presenting a slide show.

Overview

During this session, trainees present special projects on lesson plans and slide presentations. This is a fun time and trainees enjoy making up lesson plans. A short slide show is also presented (if slides are available).

Exercises:

1. How to make a lesson plan.
2. How to make a slide show.

Materials: Flip chart, marker pens, tape, crayons, old magazines, scissors, paste, material scraps and slide projector.

SESSION XXXIV

Exercise I: How to make a Lesson Plan

Total Time: 1½ hours

Overview

In this exercise trainee for whom lesson plans has been a special project gives a lecture on making lesson plans by demonstrating one he/she has made up using "Teaching Conversation in Developing Nations" as a guide. Trainees then make up a simple lesson plan and give one minute demonstration of lesson plan either by actually presenting lesson or describing lesson plan they have developed.

Procedures

Time — Activities

1. Trainee responsible for lesson plans as special project gives lecture covering:
   - a. Stated objectives
   - b. Present information
   - c. Activity
   - d. Summary
   - e. Follow-up

Sample of trainees lecture follows

2. Trainer now gives assignment (or can have trainee give assignment) that everyone is to give a one minute lesson to group. They now have 30 minutes to plan using outline and prepare lesson plan. — 30 minutes

3. Trainees give either short lesson or they have option of describing a lesson plan they might use in campo. List of lessons given are included for reference.

Short break for setting slide presentation.

List of Lessons

Proper way to use a knife
Proper way to tie a figure 8 knot
Having children draw leaves
Mulch
Environmental collection
Sample drum roll
Soil erosion work

Earthworms
Flower cycle
5 senses in the environment
Proper way to cut a tree
Extension of our bodies
How to plant a terrarium
Names of Spanish tools
Lesson plan on pollution
Lesson plan on insects
Lesson plan demonstration on trees to control erosion
Lesson plan on parts of plant
Lesson plan on identification of tree species
Demonstration on how to play drums

CONSERVATION EDUCATION

INTRODUCTION - You do not have to be a school teacher to teach basic conservation education. While the school system is the most centralized and organized medium for reaching communities, conservation education should not end there. Simple projects around your home in the backyard are just as effective and serve as an important educaional tool when shared with neighbors.

Resources: The background you already have based on your education, readings and experiences should be taken seriously as resource materials. Of special importance is the manual "Teaching Conservation in Developing Nations" which can be ordered from Peace Corps at the following address:

Peace Corps
Information Collection and Exchange
m-701
806 Connecticut Avenue, NW
Washington, D.C. 20526

Other resources include:

Basic Education Outline - a syllabus outline of basic goals and topics in a logical progression.

I. Looking at the environment

Objectives: To develop an awareness of the environment,
To understand some interelationships,
To learn how people use and abuse their environment.

Topics:
Rocks and soils,
Plant communities,
Animal communities,
Relationships and man in the environment

Projects:
Slide shows
Posters
Soil Examinations
Identification - Collections
Terrariums
Planting trees and gardens

II. Changes in the natural world

Objectives: To understand life of plants and animals,
To develop an awareness of ones impact, etc.

Topics:
Products from plants and animals
Everyday activities and how they affect the environment,
Soil building,
What plants need to survive and produce.

Projects:
Keep a diary of changes in environment,
Erosion Control project - i.e., curvas de nivel,
Water collection and conservation,
Establish a community,

Fertilizer experiments,
Evaluation.

III. Responsibility for Environment Conservation

Objectives: To understand responsibilities for use and management of natural resources,
to learn conservation practices,
to learn what local government and national programs are doing.

Topics: conservaton practices and alternatives,
sewage and solid waste disposal,
chemicals in everyday life.

Projects: Plots,
presentations (store windows),
contact and work with local agencies,
map community and do,
develop a park with teachings signs.

Lesson Plans

1. State objectives
2. Present information using visual aids - pictures, slides, etc.
3. Activity - demonstrate
   construct examples
   organize mingas
4. Summary - repeat main points
5. Follow-up and evaluation

Example: Usos de bosque
Objective: Demonstrar various finificios de las arboles
Material necesario: papel para posters
marcadores
cinta adhesive o masking

SESSION XXXIV

Exercise II

Slide Show Presentation

Total Time: 30 minutes

Overview

Trainee(s) who has taken on slide presentation as special project presents lecture on steps involved. Possibly the(se) trainee(s) could present a short slide show.

Procedures

Time	Activities
	1. Trainee(s) for whom slide show presentation is a special project gives lecture including the following steps:
20 minutes	a. Before you take pictures b. Taking pictures c. Organizing the presentation d. Equipment e. Slide show topics f. Photo reproduction stand
	Sample follows
10 minutes	2. Trainee gives short slide presentation to demonstrate lecture.

GUIDE FOR MAKING A SLIDE SHOW

For a presentation on almost any subject, a slide show with pictures of good quality is an excellent medium. The following was written as a guide to producing a slide show.

I. BEFORE YOU TAKE PICTURES

A. Planning is very important. State objectives of the presentation. Keep it as specific as possible. Make a list of what you want to show. Research your subject and define specific scenes needed.

B. Complete charts, posters and book materials to use in the program.

C. Buy quality film from a reputable dealer.

D. Know your camera and be sure to clean lenses, etc. before beginning.

II. TAKING PICTURES

A. Action shots showing specific activities involving local people are ideal. Be sure the subjects are willing and explain why you are taking the shots.

B. Watch the background. Keep the focus of the shot on your specific subject.

C. Lifting graphs and charts from books can be very useful. Also, original drawings can be changed to slides simply. Excellent title slides and conclusions with written summaries can be made by taking a photo. A simple stand can be made to hold your camera above the page or book (see sketch #1). Close up tubes (automatic extension tubes) can be used to lift photographs for slide production. The slides can be made to look as if they were taken on location. For copying slides, attachments are available which mount onto a 35mm camera. This process reduces the need to rely on costly slide reproduction processes. In essence, you are taking a slide of a slide.

III. ORGANIZING THE PRESENTATION

A. Written script - Scripts should be direct and concise. The presenter should take the time to review the presentation several times prior to the show (practice makes perfect!). Either an entire script can be written or note cards utilized.

B. Tape recording accompaniment - There are both pros and cons to a slide show including a tape recorded script and/or music. On the positive side is the ease of presentation. A taped script with music background may be more interesting to the viewers and appear more professional. A recording made by a local speaker may also alleviate language difficulties.

A few problems could arise due to:

1) difficulty in stopping to answer questions,

2) possible difficulty in coordination of tape with slides,

3) costs,

4) more equipment and electrical outlets needed.

If you decide to use a tape system, make sure that the speaker has good diction and uses the language indigenous to the area (In Ecuador, costal Spanish differs from that of the Sierra).

IV. EQUIPMENT

The list of equipment needed can vary with the needs and resources available for slide show production.

Some equipment to consider is:

1. Reliable 35mm camera - Although not necessary, many options are available to a user of a SLR 35mm camera such as:

   a. telephoto lenses
   b. macro lenses
   c. automatic extension tube sets
   d. slide copiers
   e. light filters - from skylight to polarized to infrared
   f. wide angle and fish-eye lenses

2. Slide projector - A carousel type with a remote slide advancer is best. It would be easier to have enough carousels to enable you to store the slide show directly in the carousel.

3. Tape recorder - if you prefer "canned" slide shows a tape recorder which is easy to transport and use is needed.

4. Quality film and tapes - If the project is a large one, you may want to consider buying in bulk from a photo outlet. This would be cheaper in the long run and the majority of times results in the best quality (fresh) film available.

5. Extension cords - Many slide presentations have been inconvenienced or even ruined due to the lack or nonexistence of electrical outlets and extension cords.

V. SLIDE SHOW TOPICS

Following is a list of slide show topics which we feel would be useful to Peace Corps foresters.

1. Starting a nursery - The following factors could be used as individual slide shows or incorporated into a single presentation.

    a. site selection
    b. seedbed preparation
    c. seeds
    d. planting
    e. maintenance
    f. costs

2. Agro-silvicultural systems - Specific systems could be handled as individual shows or could be used to present an overview of agro-forestry for any given area of the world.

3. Planting and transplanting a tree.

4. Types and uses of various tree species - Trees provide much more than just wood; from oils and resins to wildlife, food and cover. This show could cover specific species or present an overview.

5. Pest control - Forest pests throughout the world cost millions of dollars annually in terms of wood products lost and the associated costs of their supression. This presentation could deal with identifying when there is a problem, the causitive agent and possible remedies.

6. Exotic tree species - In some areas of the world, exotic trees are a necessity in reforestation projects. A show could help promote the tree's usage and deal with any special management problems.

7. Compost - Its benefits and usage. Extremely helpful for areas where the use of inorganic fertilizers can not be afforded. The show could demonstrate how to start a compost pile, maintain it, and use it for fertilization.

8. Erosion and its control - This could deal with the problem facing most developing countries, the alarming rate of land loss due to erosion by water and wind and ways in which to deal with it.

9. Land management - The aspect of total land management including management of agricultural crops, animals, forest, and pasture could be presented to the people to demonstrate better use of the land.

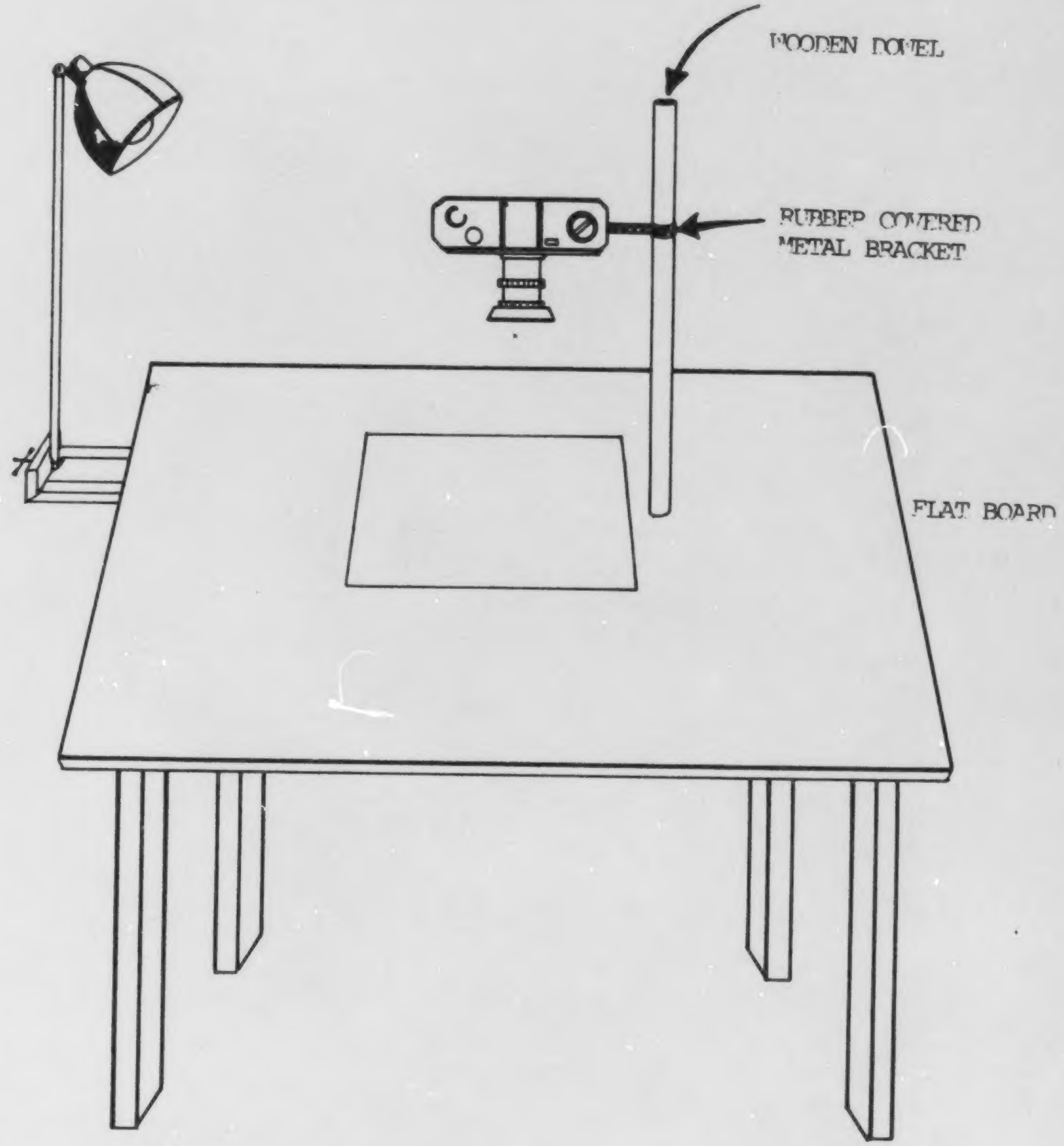
10. Chainsaw use and safety - Modern harvesting methods are on the increase in developing nations. With the increase in the use of machinery comes the increased risk of accidents and injuries. This show would cover the safe use and operation of the basic "mechanized" tree harvesting tool.

These topics are some of our suggestions. Many possibilities exist for quality shows which can aid our work in the developing countries. It is up to us, as volunteers, to recognize the need and act accordingly.

Peace Corps Volunteers Terry and Bob Simeone and Mark Jackson contributed to this article.

GOOD LUCK

PHOTO REPRODUCTION STAND


WOODEN DOWEL
RUBBER COVERED METAL BRACKET
FLAT BOARD

(Fig. 53)

SESSION XXXV

Small Research Projects

Total Time: 2 hours

Goals:

- To introduce the steps necessary in undertaking a small research project.
- To review record keeping.
- For trainee to look at research projects that are under way at local viveros.

Overview

Small research projects are introduced in this session. The various steps for implementation of project are discussed and the necessary records presented. Trainees will go on a walking tour of research projects underway in a local vivero. (If there are no projects to be seen in the local area, trainer can describe research projects with which he/she is familiar).

Exercise I: Lecture on small research projects and walking tour of local projects

Materials: Flip charts, marker pens, tape.

SESSION XXXV

Exercise I **Small Research Projects**

Total Time: 2 hours

Overview

Technical trainer gives lecture on small research projects. Reviews record keeping in conjunction with small research projects and takes trainees on walking tour of local research projects to illustrate points made in lecture.

Procedures

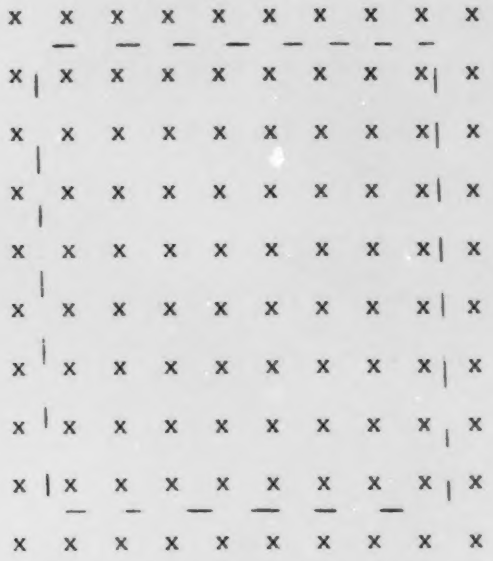
Time	Activities
45 minutes	1. Trainer/technician gives lecture on small research projects using following outline posted on newsprint.

SESSION XXXV

I. Planting design: Each species in 20m squares planted 2m x 2m.

100 trees/block

Measurements only taken from trees within the dotted line to try to limit "side effects"



20m^2

II. Block design 8 species 1 control

A. All locations on same soil type

B. All plots subjected to same conditions (e.g., exposure)

C. Three replicates per species

1	2	3	4	5	6	7	8	9	10	11	12
5 2	8 8	1 5	6 2	7 4	4 1	6 1	3 4	5 6	3 2	7 8	3 7

Method of Designating Species to Block

a. Designation of number to each species

1. P. radiata
2. P. ponderasa
3. P. patula
4. P. oocarpa
5. E. globulus
6. E. regimens
7. E. --------
8. E. --------

b. Designate species to blocks:

1. Put pieces of paper in hat (or cup) from 1 - 12.

2. Put pieces of paper in cup or hat with names of species.

3. 1st cup number gives column,
2nd cup number gives species,
flip coin to get row,
(Heads row 1, tails row 2).

Example: Nursery Experiment

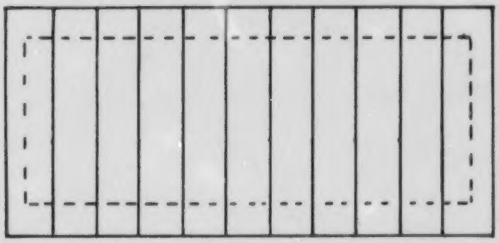
Problem: To test different fertilizers (3 types) with three different dosages.

Measure:

1. Survival (germination) might not be related to treatments; note whether trees are dead or alive
2. Height growth - each tree to have height measurement taken

I. Planting design

Rows of P. radiata



(Fig. 54)

Measure trees within dotted line to limit "side effects."

II. Block design of seed bed.

A. Allow same soil type,

B. All conditions equal,

C. Replicates for each treatment and control.

Method of designation of blocks

A. Number each treatment and control

1. Control (no treatment)
2. Urea quantity x per area
3. Urea " y " "
4. Urea " z " "
5. Superphosphate quantity x
6. " " y
7. " " z
8. " triple " x
9. " triple " y
10. " " " z

B. Designate treatments for blocks

1. put numbers 1 - 6 in hat (for column location)
2. put numbers 1 - 5 in other hat (for bed location)
3. put numbers 1 - 10 in 3rd hat (for treatment location)

	1	2	3	4	5	6
Bed 1	8	2	4	1	9	9
Bed 2	2	8	5	10	10	3
Bed 3	3	1	10	6	3	5
Bed 4	7	8	6	4	7	2
Bed 5	5	1	6	9	4	7

Once column is full, column number is removed from hat;
Once bed is full, bed number is removed from hat;
Once same treatment number has been drawn 3 times, it is removed from hat.

The results of the project will depend on: Keeping CLEAR, GOOD RECORDS.

15 minutes

2. At the end of lecture technical trainer reviews record-keeping not only for small research but other record keeping activities that have been discussed or introduced since training began. (Trainer can have participants contribute to newsprint list that is partially completed if he/she desires).

3. Technical trainer takes group on walking tour pointing out various research projects and asking participants what sort of data they suppose is necessary for each project.

SESSION XXXVI

Individual Interviews

Trainer's Note: This session is conducted exactly like session 17, Day 7 except trainers will interview different trainees than previous week.

SESSION XXXVII

Soils

Total Time:

Goals:

- To introduce varieties of soils found in host country.
- Soil fertility is explained.
- To discuss fertilization of soils.
- To go through steps for taking soil samples.
- Techniques to be used in soil conservation extension are explored.

Overview

Technical trainer introduces the subject of soil in host country(ies). Talks about different types, fertility, and fertilization as a means of improving soil quality. Explains steps for taking soil samples. Discusses techniques to be used in soil conservation extension work.

Trainer's Note: It may be possible to get a local soil expert to give presentation during this session.

Exercise I: Lecture on Soils
II: Movies

Materials: Flip charts, magic marker, tape, movies

SESSION XXXVII

Exercise I: Soil Lecture

Total Time: 1 hour

Overview

Technical trainer introduces soil section of training, covers varieties found in host country (ies), fertility of soils, and fertilization of soils. Explains steps for taking soil samples. Gives examples of techniques to be used in soil conservation extension work.

Procedures

Time	Activities
	1. Technical trainer gives lecture on soils. This lecture must be country specific and if not, trainees must know how to find specifics on host country. Following is a sample outline for use by technical trainer.
	2. Slide show.
	3. Field trips - visit to poor and good soil management and the affects on crops.

SESSION XXXVII

I. Soils of Ecuador

A. Sierra Soils

1. Volcanic origin.
2. Hardpan (cangahua) at varying depths below top soil; hardpan compressed fine (powder like) particles with little structure.
3. High elevation - there are deep soils of volcanic origin which are very feral.
4. In the valleys, the soil is sedimentary from the effects of erosion.

B. Coastal Soils

1. Provencia los Rios - Best soil in the country is of volcanic origin; two to three harvests per year.
2. Rio Guayas - Sedimentary soil from the river delta; fertile and good rice land.

C. Oriente Soils

1. Generally poor soils.
2. Most nutrients locked up in the biomass.
3. Nutrients (especially nitrogen) are quickly leached from the soil.
4. Two areas suitable for crops - soil of volcanic origin:
    a. Lago Aqua - Coco
    b. Southern Sector - Zamora
5. Silvo-Agro-Pastoral Systems can be used (Trees - Crops - Pasture) on a rotational basis.

II. Soil Fertility

A. Generally soil is:

1. of low fertility in the orient,
2. of high fertility along the coast.

B. Problems:

1. Phosphates: Fixes in the soil and becomes unavailable to plants; in places must add up to 300 $Kg/_{ha}$ of P_2O_5,
2. Potassium: Also fixes in soil and is unavailable to plants,
3. Nitrogen: Easily leached out of soil in areas of high rainfall.

III. Fertilizers

A. Generally, the campesino does not have much knowledge or understanding in the use of chemical fertilizers and/or composting.

B. Organic Fertilizer: Material generally not available for use as fertilizer; needs more fuel, and/or food for animals and man.

C. Some soils lack certain nutrients.

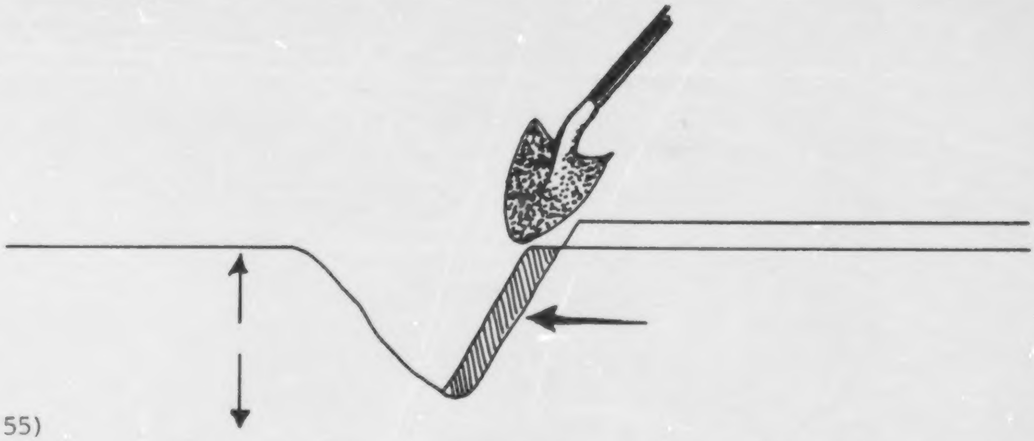
a. zinc (Zn) - needed in corn production in the highlands,
b. sulphur (S) - needed in legume production in the highlands.

D. Most common fertilizer used is super-phosphate simple (P + sulphur).

IV. Soil Samples

A. To determine nutrient needs, soil sample should be taken.

B. Sub-samples of soil should be taken throughout the area of same soil; then mix sub-samples and take a 1 - 2 pound sample.



(Fig. 55)

C. In Ecuador, samples can be sent into INIAP Santa Catalina (10 km south of Quito); free analysis.

D. Analysis is free and usually takes 15 days (from time of delivery), but can take up to 3 months. Analysis will include:

a. N, P, K
b. pH, or soil acidity

E. Analysis of trace minerals can be requested (cost 200 sucres). (Ca, Zn, Fe, Mg, Ca, Mn, B).

V. Soil Conservation Extension

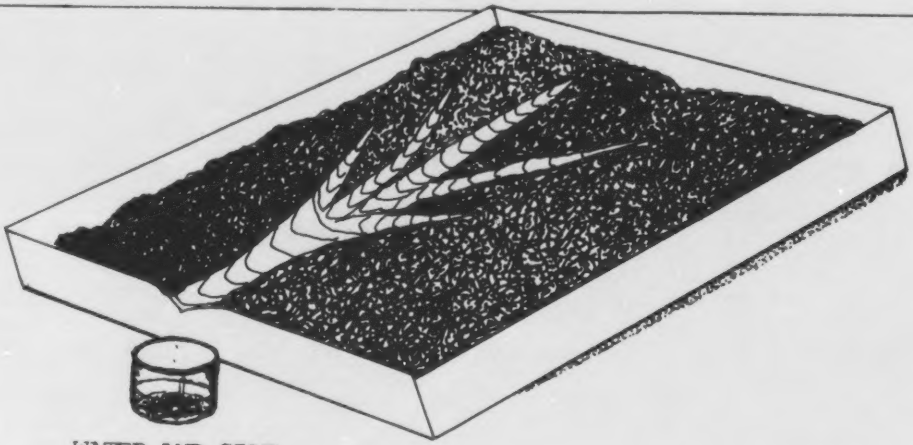
A. Techniques

1. Two boxes of soil, one covered with mulch, tilt boxes and put jars at lower end of box. Pour water over boxes and observe how clear water fills jar at lower end of mulchified box.

(See diagram on following page)

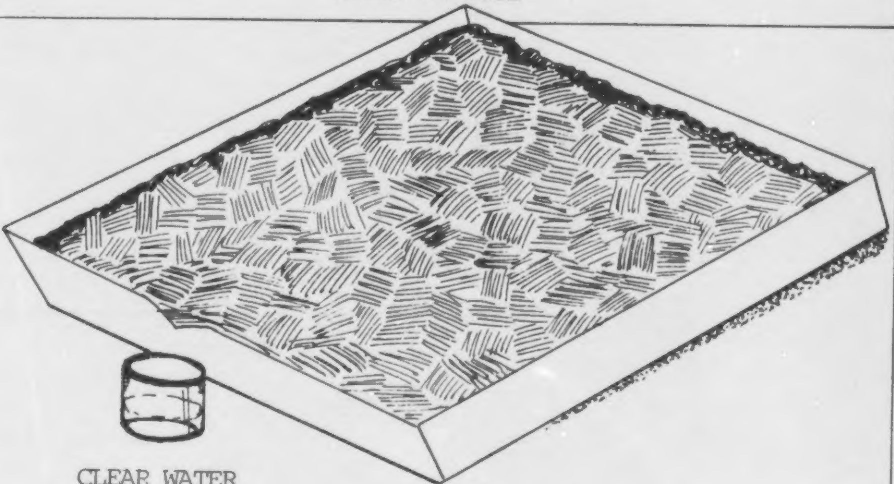
PREVENTION OF SOIL SILTATION

BARE SOIL


WATER AND SILT

(Fig. 56)

MULCH ON SOIL


CLEAR WATER

(Fig. 57)

SESSION XXXVII

Exercise II

Movies pertaining to Soil, Soil Erosion and Watershed Management

Total Time: 2 hours

Overview

Since it would not be possible to have trainees see every kind of soil erosion, soil management and watershed management, we showed movies which did give trainees a broad picture.

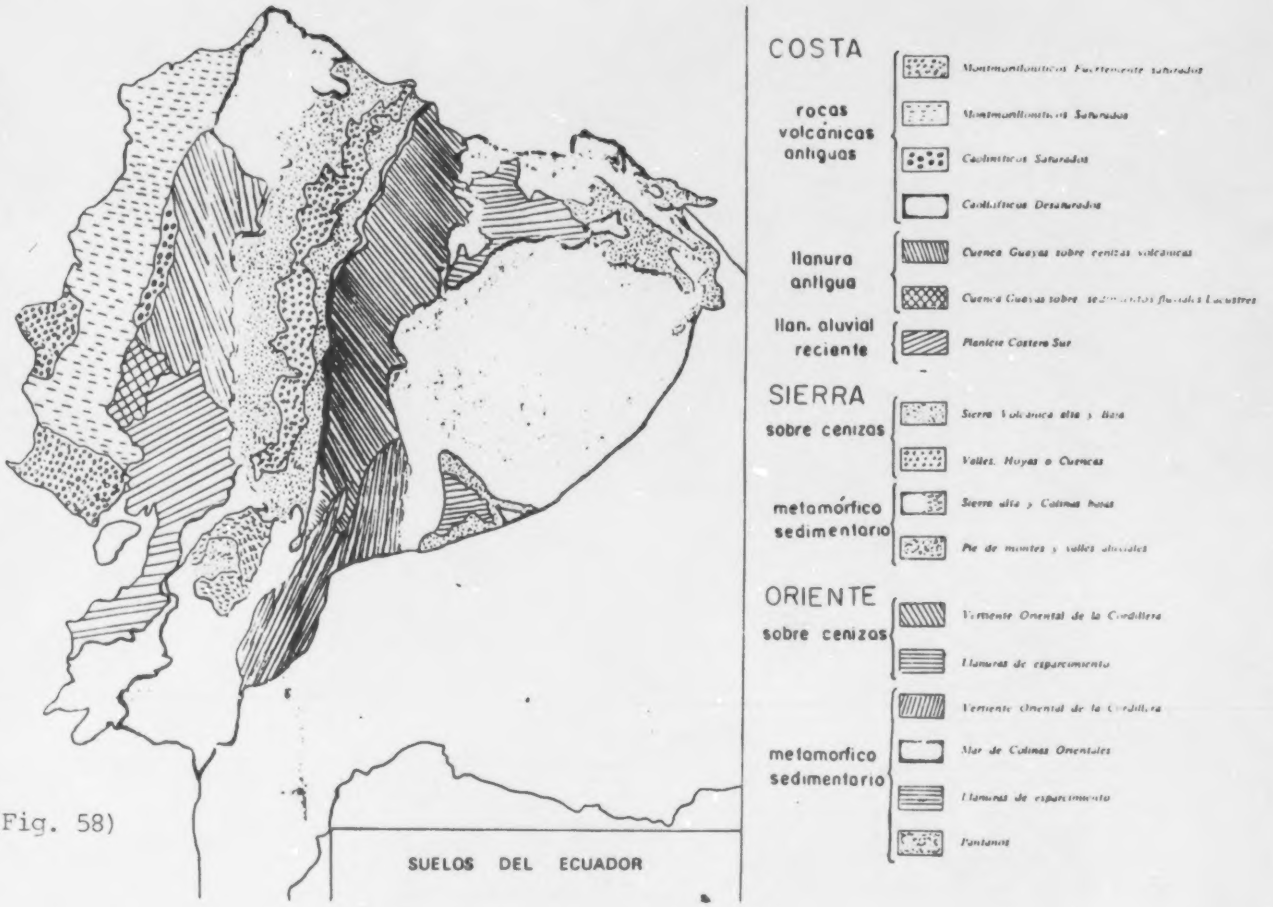
Procedure

Time	Activities
	1. The following movies are shown; technical trainer makes comments and answers questions after each film.
14 minutes	a. Soil Erosion
12 minutes	b. What is Soil?
25 minutes	c. Water movement in soil
11 minutes	d. What is Ecology?

Questions and comments take between 5 and 10 minutes

Trainer's Note: You will want to look around for good movies on soil. We only went to one source and found later that there were several we could have used.

SOIL CHART OF ECUADOR


COSTA
rocas volcánicas antiguas
Montmorilloniticos Fuertemente saturados
Montmorilloniticos Saturados
Caoliniticos Saturados
Caoliniticos Desaturados
llanura antigua
Cuenca Guayas sobre cenizas volcanicas
Cuenca Guayas sobre sedimentos fluviales Lacustres
llan. aluvial reciente
Planicie Costera Sur
SIERRA
sobre cenizas
Sierra Volcanica alta y Baja
Valles, Hoyas o Cuencas
metamórfico sedimentario
Sierra alta y Colinas bajas
Pie de montes y valles aluviales
ORIENTE
sobre cenizas
Vertiente Oriental de la Cordillera
Llanuras de esparcimiento
metamorfico sedimentario
Vertiente Oriental de la Cordillera
Mar de Colinas Orientales
Llanuras de esparcimiento
Pantanos
SUELOS DEL ECUADOR

(Fig. 58)

SESSION XXXVIII

Spanish Language

Total Time: 1½ hours

Overview

Following the morning session, trainees should use soil vocabulary in this session. They should form sentences with vocabulary words. In this session, there should also be review of verb conjugation.

Procedures

Time	Activities
1½ hours	1. Vocabulary review 2. Sentence formation 3. Verb conjugation

Vocabulary (Vocabularis)

Cereals	Cereales
Barley	Cebeda
Wheat	Trigo
Oats	Avena
Rye	Centeno

Particle - partícula
Sand - arena
Loam - limo
Clay - arcilla
Soil structure - estructura del suelo
Clover - trébol
Boron - boro
Magnesium - calcio
Phosphorus - fósforo
Copper - cobre
Iron - fierro
Watershed - cuenca
Native grass (spreading roots) - kikuyo (Ecuador)
To load - cargar
To defecate - cagar
The potato - la papa
The Pope - El Papa
The father - el papá
Sulfur - azufre
Purple - purpura, marado
Jungle - jungla
Savannah - sabana
To calculate - calcular
Hardened - endurecido
Hard - duro
Powder, dust - polvo
Ash, (fire) - ceniza

SESSION XXXIX

Community Analysis Introduction

Total Time:

- Trainees should learn the names of the 14 sub-systems in the social cybernetics framework,
- Trainees should be able to define each system and its elements,
- Trainees should develop a series of questions for inquiry which fit into the categories.

Overview

In this session community analysis is introduced. Building on the extension workers' role, the social cybernetics sub-systems are used in this session because they were developed in Latin America and are widely used for analysis by many institutions in the Inter-American region.

Exercise I: Introduction to social cybernetics sub-systems.

Materials: Flip charts, marker pens, tape.

SESSION XXXIX

Exercise I

Introduction to Social Cybernetics Sub-Systems

Total Time:

Overview

Social Cybernetics Methodology was developed in South America and has been applied in Central and South America for the last 15 years. In this session, the 14 sub-systems are introduced and defined. Trainees then develop a list of questions for each sub-system that will generate data necessary for analysis of their communities.

Procedures

Time	Activities
	1. Trainer introduces sub-systems and gives brief lecture including:

- The community analysis model with which you will be working assumes that you can break down a community, for purposes of analysis, into a series of segments or sub-systems.
- Each segment, in the real world, interacts with the other to produce a continual movement and balance which keeps the community active. Change in one segment can affect the other and vice versa. Intervention will do the same, e.g., if you introduce improved piggery techniques by penning up pigs and feeding them rather than letting them forage for food (an economic intervention), you affect community health by reducing swine-borne diseases.

  Cutting across all segments of the community, you will find that there are common elements. These common elements are defined as:

A. resources (both human, natural and manmade);
B. problems possibly exist - problems are defined as the gap between what is and what should be (what "should be" is often defined culturally);
C. patterns exist which give you clues about what is there, and how persons

perceive them (these patterns of behavior often include cultural habits, as well as biological necessities); and, finally

D. among the human resources you will probably find that leadership exists in many of the sub-areas of the community.

The following model* describes this approach to the community:

SUB-SYSTEMS

Kinship	Birth, sex, marital status, ethnic groups, habitation, migration, family, relatives, demography, population.
Health	Hygiene, infirmity, hospitals, campaigns, nursing, pharmacy, medicine, dentistry, sanitation, public health, mortality.
Maintenance	Consumers, bars, stores, hotels, diets, food/drink, clothing, warehouse, malnutrition.
Affinity	Friendship, love, hate, association, clubs, unions, co-ops, federations, societies, solidarity, integration.
Leisure	Tourism, holidays, games, free time, music/songs, diversions, sports, hobbies, exhaustion, relaxation.
Communications	Trips, transportation, accidents, languages, newspapers, broadcast stations, telecommunications, networks.
Education	Culture, teachers, didactics, research, study, school, library, education, academics, teaching.
Ownership	Public/private property, possessions, assets,wealth/salaries, rich/poor, distribution of wealth, stock market, GNP.
Extra-Ag-IND-ART	Manufacture, enterprises, firms, specialists, departments, arts, technologies, farming, energy, extractive industry.

Religious	Creeds, beliefs, participation, churches, ministers, rites, congregations.
Security	Police power, combativity, defense, attacks, crimes, violence/war, armed forces, military operations, fear.
Administrative	Public power, planning, political parties, bureaucracy, regime, public administration, government.
Judicial	Laws, justice, rights, duties, courts, codes, legal process, jurists.
Status	Prestige, respect, merit, competition, privilege, titles, excellence, elites, "who's who", nobel prize, monuments.

Trainer's Note: We have used this model because it is all inclusive of social sub-systems used in social planning in the Americas. You may wish to use a shorter version called KEEPRAH, Holistic Model, developed by Phil Donohue and used in the early 1960's at Peace Corps Training Center, Escondido, California.

Explain what each sub-system is, if necessary.

If you were doing a community analysis, you would formulate a series of questions under each sub-system, then try to find the answer to the question by going into the community and seeking information.

1 - 1 ½ hours

2. Ask the group to break into small groups of 5 or 6, and brainstorm questions in each area: for example (write these examples on flip chart) as follows:

Kinship

(This has to do with family patterns, relations and organization)

1. How big are families?
2. Is the mother or the father the decision maker, land owner, bread winner, etc.?
3. Who raises the children?
   etc.

Education

1. What is the average grade that children achieve in school?

2. Are there schools? etc.

Trainer's Note: You have several choices here. Each group may do all sub-systems or may select one or more then share results with the other groups.

30 minutes

3. Bring the group together, if appropriate, share questions. If not appropriate, move on to asking people how they plan to find out the answers to their questions.

   Hint: There are several methods of gathering data and the group should try out a variety of ways: sitting in one place and watching what goes on (flow analysis), asking questions, looking for anything written if it exists, conducting a non-threatening interview, observation, etc. Each person should think about how he/she is going to gather data. Stress that each person must keep notes and write down findings in their journals.

SESSION XL

Soil Erosion

Total Time: 4 hours

Goals:

- Acquaint trainees with local soil erosion problems.
- Have trainees build gully plugs for erosion control.
- Trainee who has taken this on as a special project gives brief lecture and describes activities.
- Investigate vegetation at erosion site.

Overview

In this session trainee who has taken soil erosion as special project gives brief lecture and describes day's activities. Trainees go out in the field and implement gully plug(s); investigate plant life on and near erosion site for possible planting.

Exercise I: Lecture on erosion: practical erosion control

Materials: Shovels, local brush, paste for weaving brush. (possible to use trees that were thinned in earlier session).

Exercise I

Total Time: 4 hours

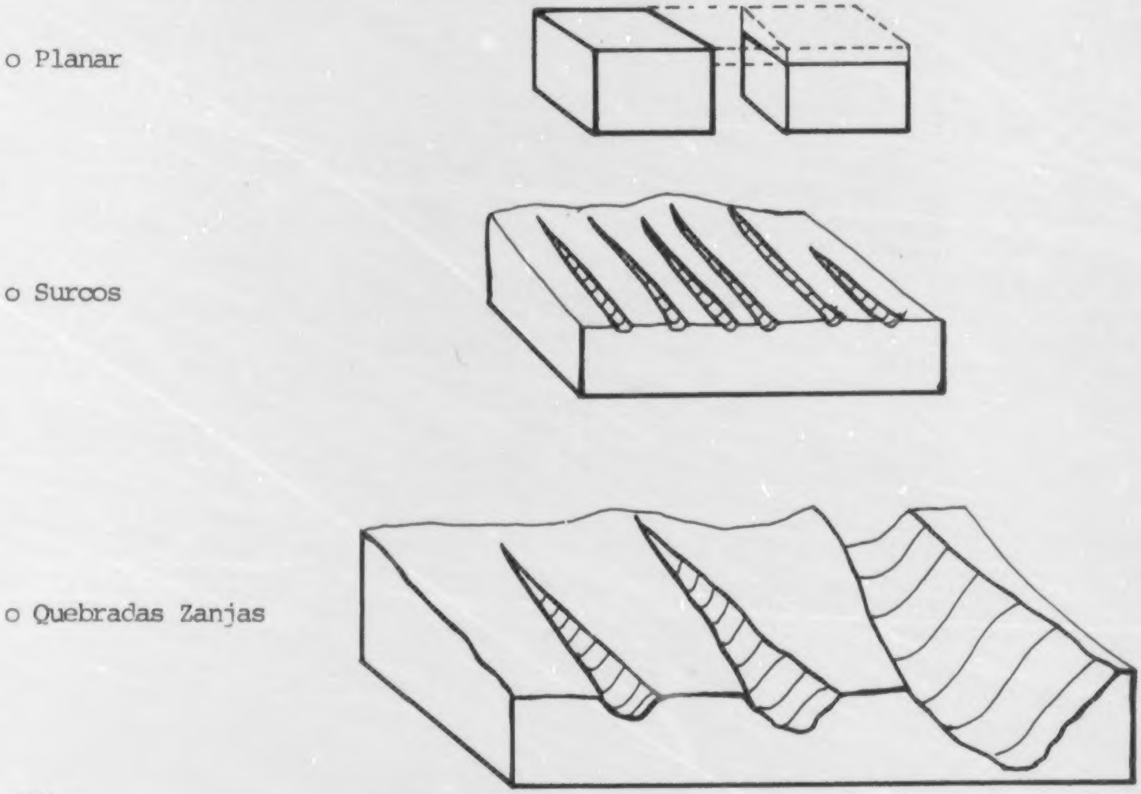
Overview

Trainee who has previously taken soil erosion as special project, and who has field experience will give short lecture and explain activity before going into field. Then trainees will investigate vegetation and build gully plugs at erosion site.

Procedures

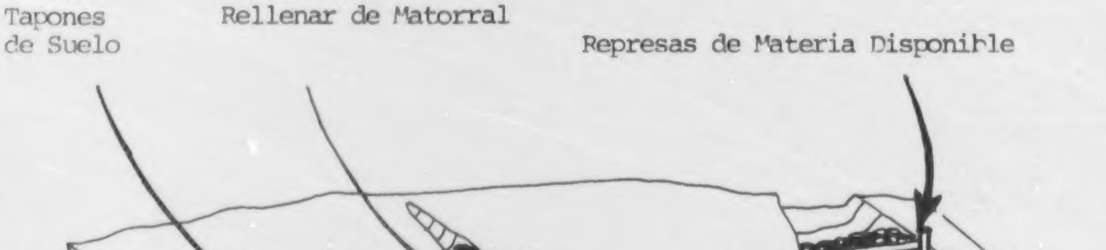
Time	Activities
20 minutes	1. Trainee gives lecture on site visit. Describes activity. Trainees break up into groups with forester in each group.
20 minutes	2. Trainees in groups move to erosion site; investigate and record vegetation around site. Each group records their observations.
3 hours	3. Each group moves to build gully plug as described earlier at place designated by special project trainer.
20 minutes	4. Technical trainer supervises gully plugs. When plugs are completed he/she calls groups together to discuss vegetation in area and to explore methods to be applied in erosion control.

LOS 3 TIPOS DE LA EROSION DEL SUELO


o Planar
o Surcos
o Quebradas Zanjas

(Fig. 59)

ESTRUCTURAS PARA ZANJAS


Tapones de Suelo
Rellenar de Matorral
Represas de Materia Disponible

(Fig. 60)

SESSION XLI

Spanish Language

Total Time: 1½ hours

Overview

During this session, trainees are given the following soil erosion phrases. They are to translate and illustrate each phrase.

- Para controlar la erosion siembra en curval de nivel, en terrazas o en figas.
- Asi conservaras la fertilidad de su suelo.
- Usa las terrenos planos para cultivos anuales que necesitan carpidas.
- Los terrenos muy inclinadas debes cubrirlos con montes o pastas.

In this session trainees prepare simple charla on building gully plug. Charla should include directions.

Procedures

Time	Activities
1½ hours	1. As described in overview.

Problem Analysis

Total time: 2 hours

Goals:

- Using same cybernetic social sub-system as used in session 39 trainees do problem analysis.
- Explore possible solutions measuring each solution for impact on 14 social sub-systems.

Overview

Building on community analysis from session 39, trainee should analyze problem using the 14 social sub-systems to discover resources, patterns, and see how possible solutions affect other segments in the community. They may also discover possible support for solutions.

SESSION XLII

Exercise I

Problem Solving

Total Time: 2 hours

Overview

In this session trainees work further with the 14 social cybernetic sub-systems to see how each problem and each solution impacts on sub-systems other than the one with the original problem.

Procedures

Time	Activities
	1. Trainer describes the following problem solving system to group (place on newsprint).
1½ hours	a. Problem identification b. Information gathering c. Pre-conclusion (hypothesis) d. Diagnosis e. Brainstorming f. Decision making g. Planning h. Implementation stages
	Trainer now gives the following directions:
	We are going to give you some problems we have identified or, in other words, step one. You will check problems with 14 sub-systems to see how many are affected. This is step 2. Step 3 will be your preconclusions and will have to include some assumptions on your part. Step 4 will be your diagnosis of the problem. Step 5 you will brainstorm for possible solutions. Step 6 you will decide on one solution and once again see how solutions will affect other sub-systems. Step 7 you will decide how your solution could get implemented. Step 8 try to look at what steps would have to be taken in implementation and what other sub-systems might be involved.
	You will list all steps taken on newsprint. At the end of this exercise you will describe to the group your 8 step process. Each group will have a different problem on which to work.

Trainer's Note: We have listed several problems that volunteers have faced during their service. You may wish to add others.

2. Groups now describe on newsprint, the problems and process they used as a group. 30 minutes

3. Trainer summarizes, emphasizing that there is no way to effect just one sub-system with a solution as there is no problem that effects just one sub-system. 5 minutes

Possible Problems for Analysis

1. In a small community a neighboring large land owner has offered a piece of land for a forestry project. The PCV has organized the group and since everything except the final arrangements for purchase of the land was ready, the group decided to proceed with planting one hectare of trees.

But after a year permission to purchase the land had not been arranged. The landowner therefore decided to sell his land and move to the city. The new owner refuses to recognize the value of the trees planted and the group is angry with the PCV.

2. A PCV organized a tree planting project on the land of the local school and together with the students, planted seedlings.

The teacher gave permission to the president of the "PTA" to graze his sheep in the woodlot and many small trees were killed.

3. The head political person in town (temiente politico/intendente) owns a good stand of timber which he wants to clear. He asks the PCV for advice and help in the project. At first it sounds like a good extension project but it becomes clear that he intends to burn all the timber to clear and plant crops and only wants the PCV as free labor to supervise the workers.

4. In a small community a PCV has established a forestry nursery with good results - largely due to the help of the president of the Town Council who got fencing, water and wages for the laborers from the town budget.

When the trees are ready for outplanting the president comes to the PCV and asks for 2000 free trees for planting on his own farm.

5. A forestry co-op planted 5 hectares of community owned land in trees. After five years a PCV was assigned to the co-op to help thin and prune.

To facilitate care and to motivate them, families were assigned equal lots to manage and use. Then a high power electric line was built through the trees wiping out two family lots. These people came to the PCV asking her to help them get rights to trees from the other members.

6. After six months of hard work in developing an interest in forest management and success in establishing a nursery, your project is going full speed. Seeing this success your counterpart is getting nervous and realizes he is going to have to spend more time on the project than he anticipated,or else look very bad. He is planning a trip to headquarters to complain about you and to suggest that you be changed to another site.

7. In your community there is a high interest in tree planting and land is available. A meeting was called to discuss the project and Juan Vasquez was named project chairman.

After the meeting you learn that Juan Vasquez has very few friends. In fact as a store owner who sells on credit, almost everyone owes him money and is intimidated by him. It is clear that the forestry project will not prosper under Juan's leadership.

Wateshed Management

Total Time: 2 hours

Goals:

- Further discussions on soil erosion control.
- Flood control measures.
- Introduce high quality water concepts.

Overview

In this session, we discuss further soil erosion control, flood control measures, and high quality water production.

Exercise I

1. Lecture on watershed management.
2. Possible watershed management projects at trainees' site.

Materials: Flip charts, marker pens, tape.

Exercise I Watershed Management

Total Time: 1 hour

Overview

Soil erosion control, high quality water and control flooding are the topics of this lecture on watershed management.

Procedures

Time	Activities
1 hour	1. Technical trainer gives lecture as follows:

Trainer's Note: You may want to bring in an expert to do this lecture if technical trainers do not feel competent to cover this session. If technicl trainer does cover this lecture, you may want to use slides or movies to illustrate points.

Watershed Management

Soil Erosion Control

Objective - To produce high quality water and control flooding.

To accomplish this requires integrated management of cropland, rangeland, pastureland, forest land and urban development.

For forest land, this objective often differs from that of timber management.

Timber management is producing the most commercial wood that can be grown on a W/S, managed on a sustained yield basis, and harvested at regular intervals.

In contrast, W/S management could be total protection with no timber harvesting or other disturbances.

Generally, however, good timber management is compatible with W/S management.

Aspects

Two aspects of W/S management are:

(1) Watershed protection, and,

(2) Flood prevention.

Watershed Protection - is accomplished by applying land treatment measures such as tree planting, contour farming, pasture planting, dam control, debris basins, streambank stabilization, etc.

Flood Prevention - is accomplished with flood water retarding structure and stream channelizations. PCVs will be invovled in diagramming and applying forest land treatment measures, for watershed protection. They normally are not involved in flood prevention so this will not be discussed further. Since much of the volunteers' tree planting will be done on steep, badly eroded hillsides, the following two supporting conservation measures (EMDEFOR is using both in their forestry program) are valuable to know:

(1) gradonis and,

(2) bench terraces.

Gradonis - are small terraces that run level or nearly level across the slope - trees are planted in the gradonis (see Fig.61). They can be built and maintained by hand. They can also be constructed by animal drawn implements or by machines.

Their purpose is to change a steep slope to many continuous flat slopes and to change long slopes to a series of short slopes, thus (1) trapping run-off and infiltrating it into the soil to aid in seedling survival and growth, and (2) reducing erosion and sedimentation (see fig 61).

Gradonis are needed, but not limited to planting sites that recieve less than 800 mm (32 inches) of rainfall per year. They can be built on slopes up to 35° (70%) but are better suited to slopes of less than 30° (58%).

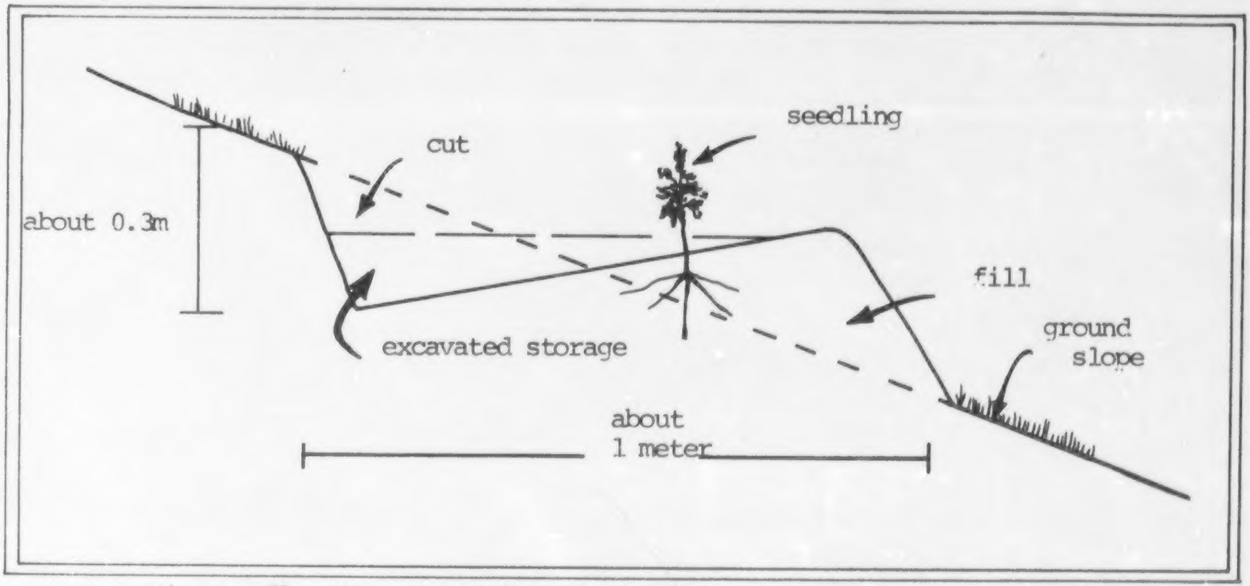
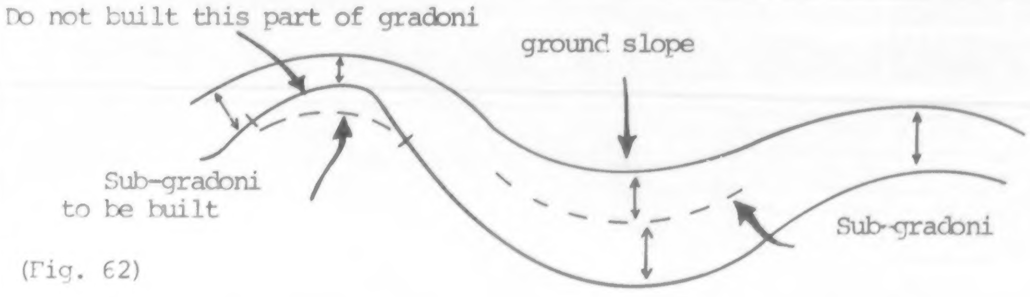

seedling
cut
about 0.3m
fill
ground slope
excavated storage
about 1 meter

Figure 61. Cross Sectional View of Gradonis

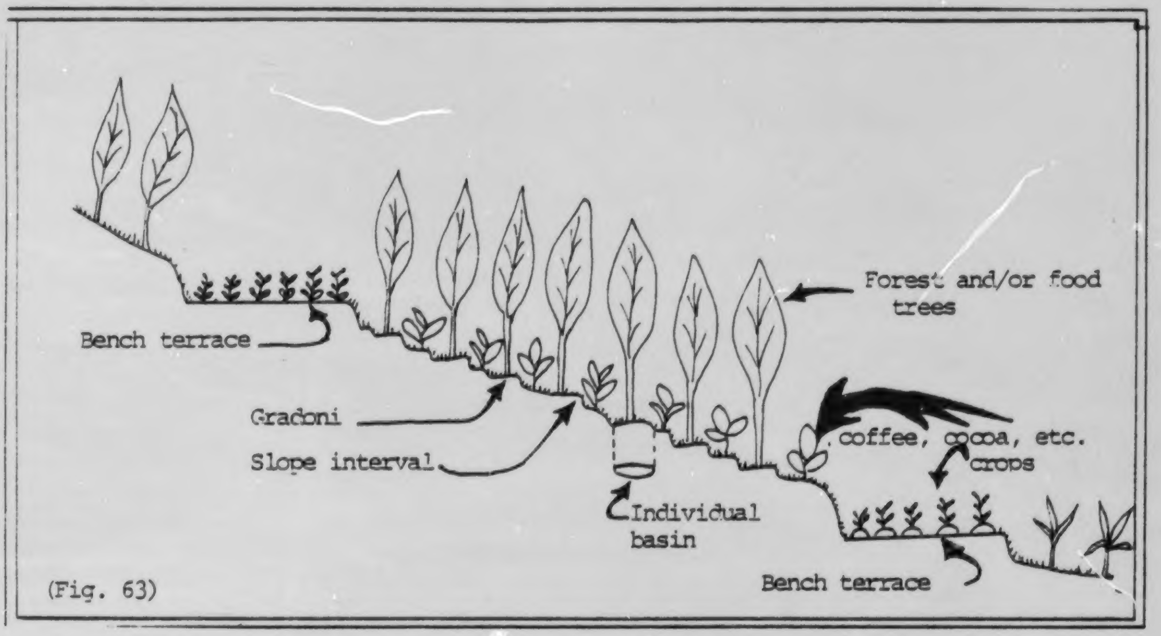
Gradonis Spacing - is determined by the desired tree spacing - usually 2 x 2 or 3 x 3 meters. The closer spacing is recommended on the critical eroding areas to obtain a quicker crown closure and litter (mulch deposit on the forest floor). The trees can be thinned as needed to maintain plant vigor. The thinnings can be utilized for fuel or other uses.

Due to slope conditions, the gradonis often come out wider than the desired spacing. To have complete land utilization or a fully stocked stand, a better or substitute gradonis should be used as illustrated below.


Do not built this part of gradoni
ground slope
Sub-gradoni to be built
Sub-gradoni

(Fig. 62)

Bench Terraces - Bench terraces are too expensive to construct for forest plantings alone. They are, however, used in agro-forestry projects (EMDEFOR is experimenting with them). Crops are grown on the bench terraces; trees are grown on the slopes between the terraces. For additional soil stabilization, the trees should be planted on gradonis also. This practice affords needed W/S protection while allowing the landowner to farm part of the land. See Fig.63.


Forest and/or food trees
Bench terrace
Gradoni
Slope interval
coffee, cocoa, etc.
crops
Individual basin
Bench terrace

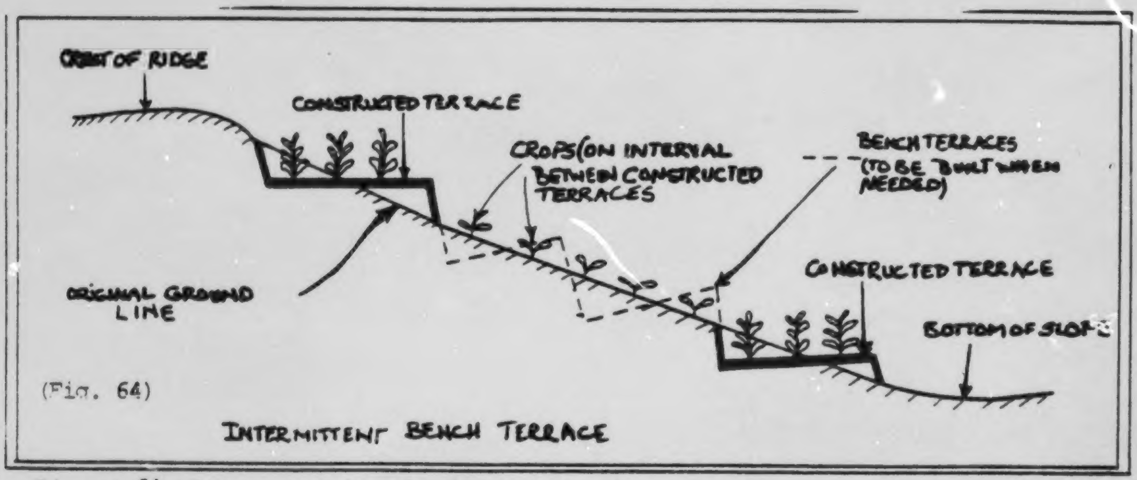
(Fig. 63)

Cross-sectional view of intermittent terraces

Individual basins can be substituted for the gradonis. Round basins are constructed (about 1m in diameter) with a 10% back slope. The trees are planted in center of the basin.

General specifications for bench terraces - The terraces can be constructed by hand; this provides additional employment for local villagers. Figure 64 shows the cross sectional view of a bench terrace.

(See Figure 64 on following page)


CREST OF RIDGE
CONSTRUCTED TERRACE
CROPS(ON INTERVAL BETWEEN CONSTRUCTED TERRACES
BENCH TERRACES (TO BE BUILT WHEN NEEDED)
ORIGINAL GROUND LINE
CONSTRUCTED TERRACE
BOTTOM OF SLOPE

(Fig. 64)

INTERMITTENT BENCH TERRACE

Figure 64 Cross-sectional view ot bench terrace

Bench Terraces should be no longer than 10 meters - runoff from longer terraces is difficult to manage. The horizontal grade of toe-drain is 1 percent to safe outlet (waterway).

If topsoil is available, it should be cut away and put to one side and spread back on the terrace when it is finished.

The top (first) terrace is built just below the ridge. Downhill spacings of the other terraces is 3 times the width of the previous bench terrace.

Run-off Disposal - Excess run-off is inevitable and a protected waterway is needed to drain it safely down the slope. A natural depression -not a large gully- can be used. It must be reshaped into a parabolic shape and sprigged with a soil binding grass (i.e., kukuyu grass). The sprigs should be about 15 cm apart. A light mulch and fertilizer will help to establish the grass.

A parabolic shaped bow - used in shaping the waterway can be made from bamboo or other materials. A parabolic shaped bow is illustrated below.

PARABLIC SHAPED BOW USED IN SHAPING WATERWAYS

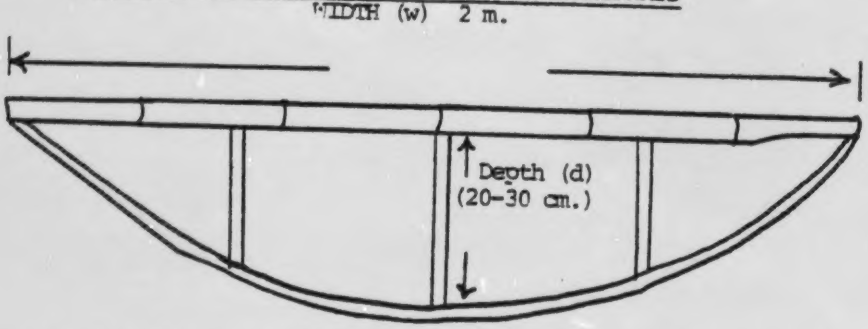

WIDTH (w) 2 m.
Depth (d)
(20-30 cm.)

Fig. 65

The rear part of terrace, called the toe-drain, functions as a drainage ditch toward the waterway.

In order to avoid overbuilding and excessive expenses, the following principles should be observed:

1. Divide rather than concentrate runoff, if possible.
2. Use adjacent, well protected grassland or forest land to diffuse run-off.
3. Use locally available materials if possible.
4. Select suitable waterway sites carefully to reduce construction cost.

Structural measures may be needed on slopes over 20% or where flow velocity exceeds 1 meter/second.

Costs - Cost depends on slope, soil, type of terrace, width of terrace, presence of rocks, etc., and the tools used to build them. Intermittent bench terraces, including waterways are estimated to cost about \$250 per hectare (125 man-days). Gradonis cost about \$180 per hectare (about 90 man-days). A man with hand tools can move, in the average, 4 cm^3 of soil in 8 hours. Actual records, however, are needed before detailed costs can be estimated.

SESSION XLIV

Spanish Language

Total Time: 1½ hours

Overview

One of the objectives of this program is for trainees to be able to deliver charlas on technical subjects at their sites. In this session, previous charlas are discussed and trainees receive assignments to do two charlas each. Groups can decide to work on the same two (this may be desirable for those who are not as proficient in language skills) or for each participant to give a different charla (in more advanced groups). Charlas should be written out and lesson plan guidelines reviewed.

Procedures

Time

Activities

1. Charla assignments are given. Possible topics;
    1. Ten reasons we neeed trees,
    2. Preventing soil erosion,
    3. Why host country is involved in forestry.

Vocabulary

To fill (with earth) - rellenar
Gully - carcavas
Sodium - sodio
Sand bank - banco de arena
Sediment - sedimento
Hardpan - durapan; capa enduricida, conguil (Ecuador
Flood - inundación
Fertile soil - suelo fértil
Horizon - horizonte
Dike - dique
Parent material (rock) - material original; roca madre
Oxygen - osigeno
Carbon dioxide - dioxide de carbono
Root system - sistema radical
Wave (water) - onda
Water fall - cascada, salto de agua, caratatas (large)
Pollution - contaminación ambiental.

SESSION XLV

Review of Expectations - Mid way

Guest Speaker (to be announced)

Total Time: 3 hours

Goals:

- To review trainees' expectations from Session I. Assessmeent of objectives, directions.
- To have input from host country speaker.

Overview

At this point roughly mid-way through training, trainees' expectations are reviewed to determine if they are being met. Given the scope of training, are the goals which are being met realistic? Will they be met under this program?

Exercise : 1. Review expectations

2. Presentation from host country guest speaker

Materials: Trainees' expectation list from Session I.

Exercise I — Trainee Expectations

Total Time: 45 minutes

Overview

At this mid-point we review trainees' expectations. We look at whether they are realistic and whether they will be met later in the program. This is a good time for trainees to see how much progress they have made.

Procedures

Time	Activities
5 minutes	1. Trainer asks groups to form as they did the first day and look at their expectations. Ask yourselves the following questions (posted on newsprint). a. How many expectations have been met? b. Of those not met, are they realistic of this program? c. Which ones are not yet met?
20 minutes	2. Groups assess expectations and discuss them using questions posed by trainer.
15 minutes	3. Groups report findings to entire group.
5 minutes	4. Trainer responds, points out expectations that could possibly be met in future sessions. Reminds trainees of their responsibility for their own education process.

Exercise II Guest Speaker(s)

Total Time: Open (not to exceed 3 hours)

Overview

We found that lecturers who were asked to speak, unless they were experts (and we recommended experts in some previous sessions), were unable to cover the necessary material. However, we believe there was value in having host country nationals address the trainees, and we did not want to inhibit speakers by our guidelines. Here we suggest that one or more host country people in the forestry field be asked to address the trainees in their own language.

Procedures

Time	Activities
	1. Invited guest(s) speaks to trainers on forestry topic of their choice.

Spanish Language

Total time: Open

Overview

Trainees work on vocabulary pronunciation and form sentences. Review of grammar rules. Summarize host country speaker presentation from previous session.

Procedures

Time	Activities
	1. Summary of host country speaker's presentation,
	2. Vocabulary,
	3. Grammar roles review.

Vocabulary

Holes - hoyos; pazetas
Growth - grecimento
Yield - rendimiento
Native forest - monte; Monte native; bosque native
Jungle - selva
Woodlot- arboleda
Percent - porcentage
Sod - chamba
Stem - tallo; fuste
Break - quiebra
Small end diameter - diametro el fin inferior
Large end diameter - diametro el fin superior
Trunk - travoco
Rot - pudrición
"Conk" (fungus) - hongo
Heartwood - duromen
Pith - meldula
Sapwood - albura, samago
to limb - desramar
to load - cargar
Cable - cuble
Hook - gancho
Landing - cancha
Resin - resina
Sap - savia
Sow - sierra, serrucho
to measure - medir
Choker - tecla, estrobo
Understory - satobasque, bosque bajo
Utilization - utilización
Supressed - suprumido
Dominant - dominante
Codominant - codominante

Vocabulary (continued)

Statistics - estadisticia
Rotation - rotación
To graft - injectar
Graft - injecto
Swamp - pantano
Bud - uema, brote

Species Report

Total Time: 2 hours

Goals:

- To receive each participants' species report.
- To have reports presented in a creative and interesting way.

Overview

In this session, individual species reports are received by group. A trainee who has taken this project as a special one is in charge of the session.

Exercise I: Special project by one of the trainees; presentation of species report.

Materials: Individual species reports.

SESSION XLVII

Species Report

Exercise I

Total Time: 2 hours

Overview

Trainee for whom this session is a special project introduces species reports. Trainee gives brief overview of guidelines used. Trainee is asked to present these reports in an interesting and creative way, ensuring that each report is introduced.

Procedures

Time	Activities
5 minutes	1. Trainee reviews task and details guidelines used.
	2. Reports are introduced.

Trainer's Note: It is hoped that you will not have to sit through 30 or 40 species presentations; keep a list of pertinent points since everyone needs practice in making presentations. There is some risk in doing this but the creativity of the trainees in a pilot program convinced us that as long as species reports were acknowledged presentations were effective.

Forestry Issues

Total Time: 4 hours

Goals:

- o To have forestry-issue group make presentations of forestry matters as assigned.

Overview

Trainee who has taken on forestry issues as a special project, manages the presentation. This is a very interesting section and time for questions is allowed after each group completes its presentation. Trainee/manager has been encouraged to have presentations carefully planned and presented creatively. Trainees turn in paper at end of session.

Exercise: Forest issues presentation

Materials: Forestry issue papers prepared by trainees.

300

Exercise I

Forestry Issues

Total Time: 4 hours

Overview

Trainees have worked many long hours on their forestry issue papers. The amount of research will be evident not only in their written papers but in their presentations.

Procedures

Time	Activities
30 minutes per presentation & questions	1. Trainee who has assumed the role in managing forestry issue papers presents schedule. The trainer may wish to have trainees respond to each presentation; if so, the respondents should be prepared in advance. Sample of trainee/manager presentation follows.

Why Forest Issue Paper?

1. To study forestry issues related to the economy.

2. Issues chosen for study are pertinent to the economic aspects of forestry. A sample of these papers is attached for your use.

   1. Forest Management,
   2. Exotic Species vs. Indigenous Species,
   3. Forestry and Community Development,
   4. Industry and Jobs vs. Conservation,
   5. Cost Analysis,
   6. Need vs. Conservation,
   7. Forest Products other than Wood,
   8. Cooperatives.
   9. What is Extension?

Helpful Public Speaking Hints

1. Speak slowly and clearly.
2. Always face your audience.
3. If you are reading, try to establish some eye contact. Try to read slowly and change the wording so it seems more like you are speaking "off the cuff."
4. Know your notes. Make sure that they are legible.
5. Do not put barriers between you and your audience, e.g., desk.

COOPERATIVES

What is a cooperative? A cooperative is a group of people united in a free and voluntary manner for the purpose of lending services to themselves and the community. The group involved should have a common problem or bond that unites them. Service should be stressed as the main purpose, it should not a be a profit organization. The individual should not be the only one to benefit. The entire community benefits through the elevation of moral standards and business ethics brought about by an effective cooperative.

There are two basic aspects of a cooperative: economic and social.

1. Economic: the cooperative is organized with capital from its members, who are responsible for its control and use.

2. Social: the cooperative gives the people the opportunity to exercise their rights while achieving progress.

Guidelines have been developed to explain exactly what a cooperative is. The following are 11 principles of the cooperative movement.

1. Cooperatives are self-help organizations. Cooperatives exist so that members can overcome their own weaknesses by joining others, to become strong through group actions. The member is responsible for certain self-help actions which increase the power of his/her organization. The members must be aware of their standing as co-owners.

2. Voluntary association: Members must be allowed to join and withdraw from cooperatives at their own free will.

3. Open Membership: Membership applications must not be based on the basis of artificial restrictions such as race, religion, sex, political affiliation or social status. It may be limited under certain circumstances such as inability to serve unlimited members or limited to certain professions, inhabitants of certain regions, etc.

4. Political Neutrality: Cooperatives should not attempt to interfere with the political beliefs of their members. Cooperatives should try to remain independent from political parties and the government if at all possible.

5. Cooperatives must promote economic efficiency in their negotiations. Cooperatives are business enterprises which are formed to promote the economic advancement of their members. All transactions should be done on a cash basis.

6. Democratic Management & Control: Cooperatives are self-governing organizations run by their members. They operate on the principle of "one man-one vote." The members

control the management of their own society.

7. Limited returns on share capital: If a cooperative pays any return on invested share capital, it should be on a limited basis to prevent potential members from purchasing large numbers of shares for speculative purposes.

8. Fair and Prudent Distribution of Economic Returns: Surplus funds should be divided on the basis of the amount of business that the individual has with the society.

9. Promotion of Member and Employee Education: The cooperative member must receive instructions so that he/she will be effective in the daily functions of his/her society. The employees must be trained so they can effectively fulfill their responsibilities.

10. Autonomy: The cooperative must be allowed to enjoy a relative degree of autonomy in its goal-setting and management.

11. Cooperation between Cooperatives: All cooperatives should cooperate with others. In this way, cooperatives will gain strength through associating with others who have similar economic activities.

It should be recognized that these principles are the ideal. Under different circumstances, these guidelines may not be met or may be altered in some respect.

There are several characteristics that a good cooperative possesses. These include a creative force based on individual responsibility and the ability to adapt itself to meet changing methods. There should be an educational system, which should be an economic force. Finally, it must instill the spirit of unselfishness and confidence in one's fellow man.

In working as an extension agent with cooperatives, one should consider several subjects:

The extension worker may benefit by looking at traditional forms of cooperation within the community or region. Possibly, these practices can be incorporated into a framework of action.

Secondly, when no local infrastructure exists for promotion and supervision of a cooperative, or when government officials are unwilling to back the idea; it will probably never get off the ground and even fail once the volunteer has left. Keep the aims of the project realistic. Do not attempt radical changes in a short period of time.

And lastly, the essence of the extension worker's job in cooperatives is not his/her direct role in specific problem solving. The volunteer's role is to be a guide to cooperative members through problem solving and the utilization of local resources. Stress self-help.

Once principles have been understood and accepted by a few people in the community, they can proceed to organize a successful cooperative.

The following information is a basic outline of how to go about setting up a cooperative. Included are some general guidelines for financing and legalizing a cooperative.

There are two main types of cooperatives: Consumers and Producers. Each is divided into four sub-groups.

Consumers

1) Consumer stores: These offer members a better quality of goods at lower prices, and ensure the use of fair weights and measures.

2) Credit Unions: Capital is raised by the savings of the members who borrow from the union at low rates of interest. Control of credit remains in the hands of the people. Members acquire the habit of saving systematically.

3) Housing cooperatives: the solidarity of members usually provides sufficient collateral to obtain a loan to build houses for members. Also through mutual aid and self-help methods, members can greatly reduce construction costs.

4) General Services: Include all remaining types of consumer cooperatives. Examples - transporation, health insurance, education.

Producer

Includes producers of agricultural and industrial goods.

1) Agricultural sales: Farmers obtain better prices by marketing collectively. They will also sell more as a result of improved techniques that are learned.

2) Farmers Supply: Obtains through members capital and loan inputs such as seeds, fertilizer, plows, tractors, etc.

3) Rural Credit: Combats the problem of the yearly harvest being the only source of income. The source of credit is often supplied by the government, purposes for borrowing are limited.

4) Industrial: Workers become owners of their own stores; this type has not developed as rapidly as the others.

Organization of Cooperatives

This is a critical step, as it forms the basis for the working co-op.

Things to Consider

1) What exactly is the problem, and what type of co-op is the most appropriate?

2) Are there desirable conditions in the community for forming a co-op, and what are their strong points.

3) What technical aid is available (teachers, equipment)?

When the initial need and desire of a co-op has been expressed by the required number of people, an initial "Organizing Committee" is formed to piece together the necessary information. It is usually made up of 5 members, and has the following characteristics:

Characteristics of Members

- A true desire to see the co-op formed,
- A willingnes to study, accept new ideas, and work together,
- Devotes much of his/her own time to organizational work for the next few months.

The group should elect among themselves, a secretary, treasurer, and president; accurate records should be taken of activities. The first thing that should be done is a study to determine the availability of human resources.

Information Gathered in Study

- Names and addresses of members of the group and other interested people,
- Amount of educational work necessary,
- How many members, how much money is needed to ensure success.

The cooperative idea should be promoted by signs/posters/notices and by all existing members talking to other community members. If there is already a significant number of members, subcommittees may be formed to get the job done faster. Credit unions usually need 75 - 100 people; housing cooperatives may have as little as 40.

Any initial capital that would be needed to get things going can be raised by donations or by selling shares to members; each share price is determined by studying economic capabilities.

Education: Members must thoroughly understand the type of organization, since they will be directing it.
Laws: The organizing committee must find out legal requisites of incorporation; then write the by-laws of the cooperative. Each member must understand the by-laws and approve of them. They

should be sent to the authorities for review.

The Organizing Committee then forms a questionnaire to determine minimum requirements:

Personal:	Name, address, occupation, age, marital status, eduation.
Experience:	Other organizations, leadership experience, amount of spare time that can be devoted, special interests.
Economics:	Monthly total income, surplus for savings, amount willing to invest, credit rating and sources of credit.

Members should be assured that information is confidential , and questionnaires should be analyzed to determine 1) potential members and addresses, 2) list of members who have volunteered for committee work, 3) number of members who will raise necessary capital, 4) capital that can be raised immediately, and 5) amount of pledged capital that will be collected on time-payment. With this information the committee can determine the initial volume of business. When membership and capital have reached the point at which operations may be started, the organization committee is dissolved and a board of directors is elected, who will administer the cooperative for the coming year.

Volume of business will be directly proportional to the number of members who initially support the co-op. The committee must be careful not to over-estimate the economic capabilities.

Once the initial volume of busines is known, the committee can determine the capital necessary. This includes the fixed and working capital needed to initiate the operation: Invested in equipment and business expenses until the co-op can cover these expenses with its own earnings.

When a realistic estimate has been made, the total capital that can be raised should be compared with the total amount needed to start operation. If total capital is less, then the difference can be raised either by soliciting more members or waiting until it is raised by monthly pledges.

When the amount of business and necessary capital have been estimated, the committee should form an estimated budget for the first year of operations of the co-op.

After this, the organizing committee is dissolved and two new groups are picked: the general assembly and the board of directors. Their members are voted in by majority rule of all members.

The general assembly represents the supreme authority of the cooperative. It meets once a year to review and approve operations of the past year, and plans operations for the coming year. Each member of the co-op has the opportunity to voice his/her opinion and register his/her vote. Resolutions are taken by majority vote.

The general assembly delegates most of its authority to the board of directors which meets more frequently and handles problems as they arise. The board of directors is responsible to the general assembly and therefore operates the cooperative in the name of all its members.

The general assembly retains "reserve rights", among which includes the right to suspend or dismiss any members of the board who does not perform his or her duty in the interest of all members.

The board of directors is composed of 5-9 members. They usually serve in staggered 2-3 year terms, at least one being elected each year. There is no financial compensation. Each year after elections, board members elect a president, secretary and treasurer.

The board of directors is responsible to the general assembly for:

1) Administering the cooperative by the majority,
2) Meeting at least once every two weeks,
3) Handling correspondence of the cooperative,
4) Keeping records of the board's actions,
5) Organizing and planning meetings of the general assembly.

In order to oversee the daily administration of the co-op, the board of directors must delegate some of it's authority to a manager. The board fixes the salary and outlines the tasks. Whether salaries are paid by the co-op depends upon the availability of capital to the co-op and the amount of work to be done. Possibly several managers will be needed so that daily cooperative duties can be done while each continues his own livelihood.

To ensure that officials do not abuse the authority invested in them, another committee is elected annually. This is the supervisory committee and consists of three members. Whenever committee members feel that the co-op is not working in the interest of its members, they must call it to the attention of the board members. If the latter is found at fault, the committee can ask for a meeting of the general assembly to deal with the matter.

A final committee to be elected is the educational committee. It is presided over by a member of the board of directors. It's purpose is to continue the education of members and to educate new members as they join. When possible the committee finances educational programs from part of the net earnings which are earmarked for that purpose.

In order to put the whole structure into motion, capital is needed. There are three main sources:

1) Loans from other cooperatives,
2) Loans from cooperative banks,
3) Loans from the government.

Most of the capital must come from the members' own pockets, because a cooperative is a self-help organization. If loan capital is used, the benefits which the members receive will be reduced until the loan is paid. Just how much capital must be raised by members and how much may be acquired by loans depends upon the type of cooperative.

The capital is used to initiate economic operations of the cooperative and consists of:

1) Total income: amount members have spent on their cooperative,
2) Total income: pays for total expenses.

   a. operating costs,
   b. administrative expenses,
   c. taxes required by law.

3) Total income minus total expenses equals net earnings.

These are used to pay:

   a. reserve funds required by law and by-laws,
   b. interest on the member's shares (minimum 6%),
   c. educational fund.

After these expenses are paid, there may be a surplus. This can either be applied to next year's operations, or may be distributed to the members according to their patronage.

At the end of the year the board of directors reports expenditures to the general assembly. This report is drawn up by the manager and approved by both the supervisory committee and the board. It is then submitted to the members for their approval.

The members themselves must be aware of their fiscal responsibilities so that the co-op's money can be safeguarded. They must continually keep themselves informed and use their votes independently. As long as they are aware of these responsibilities, the cooperative will benefit, because members will control their own enterprise. However, if the co-op fails, members have only themselves to blame.

Members also have a collective responsiblity to vote on certain issues upon which the board cannot act. These are:

1) Approval of the board's yearly plan of operation,
2) Approval of yearly budget report,
3) Approval of the distribution of surplus,
4) Disposal of the assets of the cooperative,
5) Amendments to the by-laws,
6) Incorporation into a cooperative federation,
7) Dissolution of the cooperative,
8) In general, any act which modifies the by-laws.

The leaders of the cooperative also have responsibilities. A leader should have complete understanding of the principles and administration of his cooperative. He must have adequate knowledge of economic principles and understand the financial operations of the cooperative. He must also be aware of the limits of his authority and should set an example for others to follow. Lastly, he must cooperate with other leaders and respect the opinions of all. A group which lacks cooperation among its leaders can hardly expect to have cooperation among its members.

By-Laws of the Cooperative

By-laws vary considerably according to the type of cooperative. There is also a good deal of variation from country to country in cooperative by-laws. Each must be adapted to a different legal code.

By-laws should be designed to last the life of the cooperative. Because it is impossible to predict all the problems which will arise in the future, it is necessary to make the by-laws general in nature. They are subject to interpretation by the board of directors or general assembly as specific problems arise. Also, the amendment process should be realistic so that by-laws cannot be changed at the whim of the minority.

By-laws contain basic rules such as election dates, length of terms, number elected each year, etc. More specific information such as exact procedures for voting and nominating can be reserved for the internal regulations.

Purpose of By-Laws

I. Sets forth the general rules for governing,

   a. legal rights of members,
   b. operating procedures (administrative, financial).

II. Legalize cooperative as a business concern,

   a. establish operations,
   b. right to negotiate with third parties.

III. Incorporate the cooperative,

   a. ensure concurrence with cooperative by-laws and legislation.
   b. register with the proper authorities.

General Contents of Cooperative By-Laws

1. Constitution - Name of Cooperative,
2. Headquarters,
3. Objectives.

A. Social and Administrative

1. Members: Membership requirements and rights, loss of membership,

2. General assembly: Authority, date of ordinary session, extraordinary sessions and rules of convening the assembly records,

3. Board of Directors: Authority, members and terms, requisites, duties,

4. Management: Manager, authority, duties, dismissal,

5. Supervisory Committee: composition, responsibilities, financing.

B. Financial

1. Capital Stock: initial capital, share value, restrictions on use,

2. Financing: credit, issuing new shares, special funds,

3. Loans to members: interest, valid reasons,

4. Accounting: inventory statements balance sheet,

5. Surplus: percentage to reserve funds, education, interest on shares.

C. Dissolution

1. Voluntary and involuntary,
2. Method of liquidation,
3. Distribution of assets.

D. Ammending by-laws

1. Requirements,
2. Procedures.

Legal Aspects

Naturally, the administration and management of cooperatives are affected by laws of the country. Cooperatives are either obliged to, or forbidden from doing a number of things by law. In very few countries, there are no laws and cooperatives come under a loose administration of unincorporated groups of individuals. In other countries cooperatives come under the commercial code. But in most countries a special law exists governing cooperatives. The main difference is in the degree of detail. Some laws are very detailed, others give the national cooperative unions the right to formulate their own rules which must then be officially approved.

Almost universally, any group of people seeking to form a cooperative must first adopt by-laws, the objectives of which are clearly defined, and submit them for official government approval.

The law generally defines the conditions and obligations under which members may enter and leave cooperatives. A minimum number of members is usually required before a co-op can be registered. The minimum may vary from 7 to 20. Almost all the laws state that membership shall be open to all, except the requirement that members be above a certain age (usually 18). Sometimes membership can be limited to those living in the same village, same occupation, etc.

The law provides that the capital of the society shall be variable. If additional members seek admission, new shares will be issued. Members are usually free to leave under the law although in some cases they may be required to give notice, be liable for potential losses over a certain period of time, etc. Sometimes members are legally prohibited from resigning. This occurs in cooperatives formed for joint land use.

The law generally specifies how a cooperative is governed. Most countries' laws state that the highest authority is the general annual meeting. Each member has only one vote, some forbid voting by proxy and by mail. Some laws even detail the way in which meetings are held.

The law defines how the cooperative is to be financed. Usually there are two alternatives. One is that the cooperative may have no share capital. The members are jointly and severally liable, without limitation, for any debts or losses the cooperative may contract. The other alternative is that members subscribe shares either fully or partially paid up, and their liability is limited to the value of the shares or perhaps an amount two or three times the value of the share. It is widely believed that the collective moral obligation imposed on all members of a society by unlimited liability will promote a greater sense of responsibility.

Where a co-op is financed by shares, the rules must state the value of the shares, and the minimum and maximum number which members may hold. The minimum is usually the same for all members. The purpose of setting a maximum is to prevent any one person from having too large an interest. Some laws permit the transfer of shares.

Laws vary on whether a cooperative must do business only with members and if members must do business only with their cooperative.

Some laws insist on political and religious neutrality while others do not. Most specify what records must be kept and who has access to them. Almost all laws provide for periodical audits and annual reports to be submitted to the government. Some even delegate considerable privileges to cooperatives.

Common law and contract law are very important to cooperatives. These vary from country to country.

Cooperatives are greatly influenced by property laws. There are two important points to consider when property changes hands by sale or gift, or when the owner dies. First, is the owner entitled to transfer the property? Secondly, has he made his intention to do so perfectly clear to all involved?

Another area of concern for a cooperative is liability for injuries. Like common law, contract law, and property laws, bodily harm liability is not specific for cooperatives, but is nonetheless important.

It is the job of the secretary of the cooperative to know the legal statutes of the country and to see that they are enforced. A good cooperative secretry or manager should work to see that laws and regulations are observed, and contracts examined and implemented.

Admittedly, this paper is only a general outline. Hopefully, it has explained what a cooperative is, and basically explained the procedure of setting up a cooperative. A general idea of financing a cooperative and the laws governing cooperatives has been given.

One of the most important ideas is the basic premise of a cooperative which states that a cooperative is a self-help organization. The goal of the extension worker should be to make the cooperative a self-sufficient entity so that it will continue to prosper once he/she has left the community.

Peace Corps Volunteers Randall Stern and
Anne Wagner authored this section.

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FORESTRY AND COMMUNITY DEVELOPMENT

In many agricultural areas soil fertility has been depleted after many years of over-farming and the lack of conservational practices against wind and water erosion. As a result of these improper practices, a snowballing of problems has been created. Production from the fields has forced the farmers to clear forested lands to make new fields. Most of the suitable agricultural land has been cleared and put into production and now the farmers are clearing areas that are not suited for agriculture. The farmers are aware that their land will soon run out and that they will have to move to new areas or eke out an existance on the poor land.

The denudation of the land has led to extensive soil erosion and heavy sedimentation of the streams and rivers which in turn has led to a lowering of the water table. A shortage of forage and grazing areas for livestock has also resulted from the lack of production in the fields.

One possible solution for this problem could be the following plan: Participants in this project would include a group of farmers and the younger members of their families. The younger members must be involved from the start if they are expected to carry on the project in the future. If in the community women have the responsibility of collecting forage for the livestock, they also should be included in the planning of the project since they will be the ones who will have to go cut and collect the forage. In many cases women in the community are the experts on firewood and therefore should be included in choosing the species. The community developers' role would be to help set up and design the project. Once the project is going he/she would remain to give technical assistance and support. Part of the technical assistance would be to help establish either a community nursery or individual nurseries. If a community nursery is made, the community developer must train someone to run the nursery.

Goals for the project must be reached through group participation so that all parties involved feel they have something invested in the project and will dedicate themselves to it. Goals should be divided into immediate and long term goals. Daily possible goals could be:

Immediate:	Raising the productivity of the land by proper land management practices and incorporating soil conservation practices. An additional result would be the slowing down of deforestation trends.
Long range goals:	The establishment of a permanent firewood supply, providing a supplementary of forage supply for livestock, creating a source of timber.

In setting out to reach these goals a multipurpose program must be established leaving room for expansion and changes. Also, all possible risks and each participant's role in the project must be clearly understood before the activities commence.

PARTICIPANTS

A key concept of forestry for local community development is the participation of all segments of the community, especially those groups whose role in the community is often invisible or ignored. This project promotes the participation of women in the community to help meet the needs for alternative sources of income. One reason for this is that women are most likely to have time between crops to devote to other activities. Also, women may feel more of a need to earn additional income since they rarely have the opportunity to work outside the home and to be paid for such activities. Although the project may begin with a group of young housewives or teenage women, activities should eventually involve other members of the community in some way. The plan should decide how members would be included after its initiation and what the responsibilities of participants would be.

GOALS

In this plan the creation of alternate sources of income for project participants is the most important short-term goal. To evaluate if this goal is being achieved, participants need to examine whether the profit they earn makes the effort they put into the project worthwhile, whether the amount of profit makes an appreciable difference in their economic situation, and whether the money that they earn is available when it is most needed.

The long-range goals are concerned with the desired impacts the project would have on the community. Several of these might be:

- initiation of other projects in the community that provide alternative sources of income,
- increased appreciation and utilization of local resources,
- identification of women's activities as a stabilizing factor for the community,
- increased awareness of trees, especially indigenous forest species, as beneficial to the community,
- establishment of local nurseries that can supply fruit trees, ornamentals, and other tree species that can be utilized in community projects.

DESCRIPTION OF PROJECT:

The basis of this plan is the development of existing skills and practices for the participants. The first step would be the investigation of those activities in which women are involved and which could be developed to generate income. This example uses the processing of fruits to make marmalades and jams.

It would be necessary to know which fruits are locally used, when they are available, and how their sources are distributed

The first step in reversing the deforestation process is the need to re-establish the fertility of the soil and eliminate the need to make new fields. This could be accomplished by incorporating green manure crops into a crop rotation plan. Also, by planting certain legume tree species, which have good nitrogen fixing characteristics on "curvas de nivel", the pruning of these species could serve as firewood, eliminating the need to go to the forest for firewood.

However, if this is to be a successful project, it must be fully understood by the farmers that the green manure crops have to be turned over and incorporated into the soil before they fruit to serve as a fertilizer. It could be difficult to convince them to "throw away" a crop.

In order to slow down wind and water erosion there are a variety of solutions. To eliminate much of the problem of wind erosion, wind breaks could be established. This could be done by planting a live fence with the trees planted close together. This live fence could be planted with trees that serve more than one purpose, such as fruit trees, forage species or even berry bushes.

To control water erosion the fields must be put into "curvas de nivel" or countour lines. Along the curvas a variety of plants could be planted. Bunch grasses could be planted that serve either as forage or for roof thatching.

An agro-forestry plan using a variation of the taungya system by planting multi-purpose tree species (ones that are good for firewood, lumber and forage) could also be incorporated into the curvas. If a legume is used it would also fix nitrogen. Either exotic or indigenous species could be used. Whenever possible, indigenous species should be used. Indigenous species are much more adaptable to the climate and are more disease and insect resistant. However, if such indigenous species is not available, an exotic may be used. The advantage of using an exotic is that there are some legumes which have all of the desired characteristics: They are good firewood crops, they coppice well, their foliage is very high in protein, they are good lumber trees, and they fix nitrogen into the soil.

If the short term goals are reached, the long term goals are only a few years behind. If managed properly, a permanent firewood supply can be established from the trees planted on the "curvas de nivel". If indigenous species are to be used, the women should be consulted to find out with which woods they prefer to cook. However if exotics are used, choose a fast growing species with good coppice ability, or combine a mixture of them both.

It multipurpose species are planted they will also create a supplementary forage supply. Fruit trees such as guava from which cows like to eat the fruit may also be planted. Also incorporated into the crop rotation plan could be a forage grain such as alfalfa which after a few cuttings could be turned into the soil as a green manure.

Timber will be suplied when the trees that were planted along the curvas reach maturity. They may be cut down and used or sold as lumber. If the trees were species that coppice well, they will regenerate themselves while still serving as soil binders, firewood and forage suppliers, and nitrogen fixators. Being planted in rows and constantly being pruned for firewood will ensure that they grow straight and tall.

A direct result though not a very visible one in reaching these goals will be the level of the water table, reestablishing the ecological equilibrium and slowing down the migratory movement away from the community.

A result of shifting agriculture is the denudation of the land causing heavy soil erosion which eventually leads to the lowering of the water table. Water is no longer able to soak into the ground to reach the subterranean streams which feed the local wells. Instead,the water runs off the hills silting up the streams and rivers. The ecological equilibrium has also been disturbed: fish can no longer live in the silted rivers, and animals are being forced deeper into or in some cases out of the forests looking for food. People who rely on hunting for their food are finding it more difficult and are being forced to depend more on consumer foods. People are migrating from these older areas where the land has been depleted and the forests destroyed to newer settled areas.

An ongoing evaluation of the project should be carried out. A committee comprised of farmers, women and members of the younger generation can evaluate whether crop production is being increased and if so, is the amount of increase making these practices profitable. However, it must be kept in mind that the increase in firewood and forage must be included in the profits.

PROJECT PLANS: Forestry for Community Development

PROBLEM:

In most agricultural based communities, and especially in colonial areas isolated from larger towns and centers of commerce, the local economy is based and dependent upon the cycles of harvests throughout the year. This cycle is important to the farmer because it gives him time between harvests to do any necessary maintenance jobs and to prepare his fields for the next season's crops. But since the crops a farmer can raise on his land are often his only source of income, it also creates a season of "no money," or that time when the last harvest's income runs out and the next harvest is months away. This presents a serious problem for many rural families, one that effects almost all aspects of community life.

The following plan proposes ways in which this problem can be met by the community with the objective of supplying alternative sources of income to members of the project.

within the community. Fruits which are commonly used are oranges, grapefruits, guava and various berries. Other fruits are cultivated locally or can be harvested from indigenous forest species.

The timing of fruit harvests is important and should not interefere with regular harvests or those periods during the year when communities are involved in other established, pre-determined activities. Also important is that the income from the project is available when most needed. If only a few individuals cultivate a certain fruit on their land, it may be preferable to choose the fruit of a common forest species which would be available to all. Marketability of the fruit product should also be considered to ensure that enough profit could be generated by the project.

After discussing these aspects, participants should also consider which fruits they enjoy working with most, which would be used most in their homes, and which would yield the highest quality and variety of products.

Any community worker could be of assistance in the investigative phase of this project.. He could also distribute the results of the investigation and present the project to the community. It would be important for him to present this project to all segments of the community who may be involved or who may affect the success of the project. Such people may include husbands of the participants who may object to the activities of their wives, or to local shopowners who may be relied upon to market the products. After interested members have understood and accepted their responsibilities as participants, the development worker with several participants could initiate the plan by giving simple lessons in preparation of the chosen fruits. Harvesting, storage, hygiene and various recipes could be discussed, along with instructions on how to conserve properly their products.

START UP MAINTENANCE:

The site for group activities could be found within the community: the local school, a social center or a home of one of the participants. The individual activities could take place in the member's home. Many options exist, however, such as small groups working together in homes or using a community kitchen such as in a school.

Each participant would produce jams and preserves from fruits with which she has chosen to work and which is available on her land. Another alternative would be for the group to buy fruits at bulk rate to supply to all members. This option may be beneficial when certain seasonal fruits are very cheap in local markets.

Although the actual production of the jams should be simple, there are several points that, especially in the beginning of the project, should be carefully observed:

- production should begin with a few jams which are known to be widely accepted and relatively simple to make.

Even though they may not generate the most profit, their simplicity allows for the most certain, immediate success of the project. The project could be expanded later, after it is well-established, to include other fruit products that would sell for higher prices.

- some quota should be set fof the minimum amounts of jam produced by each member within a certain period. For example, the quota for a one-month period may be five quarts of orange marmalade and five quarts of guava jam. These quotas should be based on the minimum amount of products needed at a given season to make transporation and marketing profitable and the amount of profit possible to the producer so that participation in the project is worthwhile.
- a committee should be responsible for quality-control, examining the products according to standards they have designed, and using only suitable products for sale.

BENEFIT DISTRIBUTION PLAN:

The marketing of these jams would be the next important stage of this project. A collection site should be chosen where participants could deliver their finished proudcts to be stored until they are marketed. At this point participants could receive credit for the value of the products they have contributed and would realize their profit after marketing.

A different committee could be responsible for maintaining this collection site (posibly a member's home), keeping records of products contributed by each member, delivering products to chosen markets (possibly local shops, large town markets, or an individual buyer), and distributing profits to members after sale. The group may choose to save a percentage of the profits for future supplies needed, or individuals may buy needed supplies from personal profits.

The role of the community worker during these stages should be one of technical advice and support, perhaps helping with problems in the jam production, giving ideas for different ways and places to market the products, or giving advice on caring for the fruit trees and planting new varieties. The managerial duties should be in the hands of elected committees within the group.

Other members of the community may eventually become involved in the maintenance of this project as it expands. The men in the community may be able to supply the firewood which is needed for making the jams, local shopowners could cooperate in marketing the products, school children could be employed in harvesting fruits and a local nursery could be contacted as supplier of fruit tree seedlings so that new trees and new fruit varieties could be obtained by participants. If there is no local nursery, some groups may cooperate with the project by establishing one and having a ready market for their seedlings. In this way the project involves many segments of the community and its benefits are distributed widely.

EVALUATION PLAN:

The time for the project could initially be one year, or possibly one season, from fruit harvest to selling the products. This allows potential for program flexibility by evaluating the success or problems of the project after one season of operation. Changes can be initiated to reach better the goals of the project, or it can be decided that the program as it exists is not meeting the needs of the participants.

By looking at the long-range implication of a project such as this, we see how community-development needs can be met by forestry, in this case through the cultivation of fruit trees and the utilization of their products. On the other hand, the goals of forestry projects can be successfully met by working through a community development approach. The establishment of community awareness and appreciation of forestry in simple projects has immediate impact and thereby increases the chances for success in future projects.

SHORT AND LONG RANGE GOALS:

Goals of the project should come out of the needs and wants of the community. They should be well defined and clearly reflect the desires of the community to create good quality participation. The goals are as follows:

- students will learn about nutrition and how a balanced diet is needed to remain healthy.
- within a relativly short period of time, the garden will be producing a continuous supply of fruits and vegetables that will help provide a better diet.
- the students in the school would be receiving environmental education from working and observing the garden.
- this project will hopefully serve as a model for designing future projects dealing with other community needs.

OTHER LONG RANGE GOALS:

- The school garden plot would help educate the total community about health and gardening.
- With this new awareness families would begin their own gardens.
- As fruits and vegetables become more common in the community, the nutrition and health levels will rise.
- The one or two seedbeds of tree and shrub species may encourage the planning of a separate tree nursery.
- Trees and shrubs would be available for the students to

plant at home, in the schoolyard, or around the community.

- Trees and shrubs could be grown to promote the "week of the tree" activities.
- Trees, shrubs, fruits and vegetables could be sold to buy more seeds and tools.
- When fruit trees mature, extra vitamins could be added to the diet of the community.
- Tree species planted to provide forage for livestock would help improve the quality of livestock raised.
- Trees could be used to begin agro-forestry projects.
- Shrubs could one day be used as live fences, replacing the old.
- The experience of students working together for a common goal will possibly improve their ability to work effectively with the community in the future as adults.
- Also, community projects will help develop close ties within the comunity which may encourage young adults to remain, when so many migrate to the cities.

EVALUATION PLAN:

Methods of evaluating the project should be incorporated into the project design. A system of feedback from project and community members will help to keep the project on track. Questions that may want to be answered are: Are the vegetables growing? Are they selling? Are the students ambitious? Is the community building gardens? Be sensitive to whether the project is meeting the goals set. If not, be prepared to re-evaluate each situation and make the necessary changes.

Community developers possess many skills which can be transmitted to developing communities. The key to this approach is the answering of these needs by using the resource already available but perhaps not realized.

The above project plans have been presented as examples of how forestry can be used to meet basic human needs. This is a new concept with a new name; forestry for local community development (FLCD). FLCD projects approach forestry related problems differently than the more traditional forestry projects. In the past a top-down, large scale industrial forestry approach was taken, an approach in which individuals from outside the community benefited from the projects. Now community specific projects in which the members of the community themselves develop, plan, carry out and benefit from the project, are being stressed by both local governments and international development agencies.

FLCD has given a new meaning to the word "forestry" to encompass anything from picking fruits and canning them to integrating agriculture with forestry. This is done to meet the needs of the community.

In the examples presented, the community needs were met through their own efforts. The community identified potential problems and through forestry sought viable solutions. Each project illustrated how all segments of the community were involved, including such frequently ignored groups as women, the handicapped and the aged. As is the case in any developing country, community-oriented projects are unique to an individual setting. Problem solving techniques should take into consideration each communiy's existing level of skills, local resources and culturally accepted traditions. The end result should be the building of self reliance and sustained benefits for the community as a whole.

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FOREST PRODUCTS OTHER THAN TIMBER

The world's forests are being reduced drastically every year because of the need for timber, firewood and clearing for agricultural purposes. This has negative affects on the ecological balance of nature. A tree is more than a storehouse of tangible products, but a self-sustaining micro-environment of itself. Trees stop soil erosion, create watershed and land stability for hydrological systems, all of which make for a healthier environment. One way to maintain the ecological balance of nature is by developing products other than timber or "multi-product forestry" (MPF).

In order for MPF to be developed effectively it is essential that the extensionist reach the campesino at the community level. To the campesino, MPF means (1) better land use through aquaculture-agriculture, silvipasture or combinations of both, (2) greater economic stability through full fledged reap of plant anatomy (3) continuation of traditional and cultural uses i.e., herbal medicines. Various products of this multi-use system include: 1) food for human consumption, such as nuts, fruits, oils, syrups, 2) food for animal consumption such as fodder, fruits, seeds, 3) commercial products such as medicines, art, rubber, oils, dyes, rope, resin (tannin). By-products include silk, honey, wildlife (game meat), mushrooms, fish, and fertilizers. Other important uses include windbreaks and shade.

Some specific examples of product forestry are:

Acacia albida retains its leaves through the dry season and sheds them just as the rainy season begins. This has a number of economic benefits: a) forage is available throughout the dry season when other trees are leafless; b) at the end of the dry season, when feed is often desperately scarce, the protein-rich pods are maturing and drop off in huge quantities; c) during the hot months the trees' dense foliage provides cool shade for livestock; d) the trees leafy crown protects the soil when most grasses have succumbed to drought, leaving the ground vulnerable to wind erosion; e) the leaf mulch and continuous presence of livestock near the trees greatly enrich the soil, making it more suitable for growing crops among scattered trees; f) the trees' foliage falls off just when food crops are being planted, perfectly timed for providing soil nutrients when they are most needed; g) the trees lack of leaves during the rainy season enables sunlight to reach crops planted around it.

Other advantages of this tree include drought resistance and existence of 350mm to 650mm of rain per year. The seeds can be dried and used later for easier planting, unlike other acacia pods, which split apart and disintergrate when stored. The spreading root system provides excellent protection of soil. Although this tree is indigenous to Africa, this is a near perfect example of agro-silva pasture, and research is being done to develop it elsewhere.

Leucaena leucocephala is indigenous to Central America and offers one of the widest assortments of uses in tropical legumes.

This tree fixes nitrogen into soil, provides nutritious forage and rich organic fertilizer as well as firewood. Its diverse uses include reforestation of eroded hillsides, windbreaks and shade. A leucena pasture is almost 2m high, which gives it an added dimension; cattle find forage from ground level to eye level. Sunlight penetrates through the plants' open feathery leaves, reaching the lowest branches and grasses beneath allowing everything to grow well. In fact cattle relish the leaflets and young stems so much that they often strip the branches bare. But the leucena grows so rigorously that they can refoliate totally in two weeks. These same plants can be continuously grazed for over 20 years.

The leaves which are similar to alfalfa in digestibility, protein content and nutritional value, are particularly palatable to dairy cows, beef cows, water buffaloes and goats. However, leucena has one disadvantage; mimosine, and uncommon amino acid comprises 5% of the protein of the leaflets. If taken in excess it causes cattle to produce less than normal quantities of thyroxin. This crop should be no more than 1/3 the diet of any one given cow. Safe varieties of leucena are being developed. Nonetheless, two decades of research have shown that leucena complimented with grasses has produced cattle with extraordinary weight gains over extended periods. In Brisbane, Australia, cattle feeding on leucena gained an average of almost 1 kg/day for more than 200 days. Such growth is twice the normal amount. This species demonstrates the advantage of silva pasture while reforesting lands and preventing soil erosion.

Tamarindua indica is indigenous to the dry savannas of Africa. 250,000 tons are harvested annually, of which 3,000 tons are exported to Europe and North America. Its pulpy sweet and sour pods are used for meat sauces and beverages. The tamarind has an attractive commercial future for producing drinks, jams and confections on an industrial scale. The tree is very adaptable to dry savanna and monsoon regions as long as both have well drained soils. Because of its versatility, the tamarind deserves greater research with special attention to extensive, organized plantings. The tree is drought-resistent and frequently seen in sandy soils near the seashore. It tolerates widely different soils and is known as the "hurricane-resistant" tree because its supple branches are stabilized during strong winds. About half the pod weight consists of both sugars and organic acids such as citric, tartaric, acetic and ascorbic (vitamin C). The pulp is a rich source of vitamins and important minerals and contains more calcium than most fruits. Average annual yield from an adult is very large, 150 - 200 kg of fruit per tree or about 12 - 16 tons/ha. The pulp is often eaten fresh, directly from the pod. It is also used to season many foods, for example chutney, curries, preserves, confections, ice cream and syrups. Also, pulp is used in Worcestershire and barbecue sauces. Although the pulp is by far the most important product of the tamarind tree, the tree is also used for other products, since young leaves, pods and flowers are edible. The flowers can be an important source of honey. Seeds are used for livestock feed. Tamarind is also used for textile purposes and seeds yield an amber-colored oil suitable for foods and industrial use. Tamarind is also valuable for fuelwood. Tamarind charcoal is such high quality that it has been used for making gun powder and was a major fuel for producing gas (gasogen) during World War II. Tamarind is easy to propagate by direct seeding or by transplanting. Its seeds remain viable for months and germinate rapidly.

Mangroves are found throughout the tropics and subtropics of the world in shallow water and muddy tidal flats. Conditions most favorable for mangrove development are found in quiet bays, into which rivers flow gently. Its uses include charcoal for fuel, coastal protection from typhoon and storm damage through building and binding sand, and soil which effect their own repairs through self-regeneration. Extractions such as tannin are used to produce hard leather for shoe soles and resins are used in bonding plywood. Pulp is used for rayon manufacturing and food and wildlife production. Mangrove swamps are "the cradle of life," creating the spawning and nursery grounds for many species of fish as well as shrimps, crabs, clams, oysters and crocodiles. They are feeding and nesting grounds for many sea birds and provide home to other wildlife. Thus, many people indirectly draw their livelihood from mangroves. Mangrove areas are potential resources for aquaculture. Flooded swamp areas have the capacity to yield 10 times as much per unit area as the Atlantic Ocean.

In conclusion, any new forestry project introduced in-country must be tailored to meet the needs of the local, rural community. In doing this, a convenient programming tool is to group comparable systems together. The main categories are: small scale forestry (village woodlots), agri-silvi-culture, arboriculture (tree farming), silvo-pastoral and multi-product forestry. All systems yield products that can either be directly consumed or easily harvested and marketed by the local community. The objective of any forestry project is to benefit from trees while restoring the ecological balance to the land.

FORESTRY EXTENSION AND DEVELOPING NATIONS

Forestry extension is the science and art of transferring knowledge from research and experience to the practical use of the people. Forestry extension is a science from the standpoint that it requires methods of research and investigation; and an understanding of the basic principles of forestry. It is an art from the standpoint that the dissemination of this information requires a definite personality, style and technique; and an understanding of the people with whom you are working. This "art of dissemination" associated with forestry extension is what we will discuss in this paper, assuming that the reader already has an understanding of the science.

The process of dissemination can be seen as a bridge which links the existing body of knowledge of forestry to the public.

Selecting the right bridge or method of dissemination is critical. The method must match the means and resources of the community. To stretch the analogy of a bridge still further, if your bridge is not well secured on both ends, it will not support your program. As Peace Corps volunteers in developing nations, you may find it hard even to see both ends of the bridge, let alone make them secure. Indeed, it is obvious that sound forestry applications and practices have not yet "bridged" the gap to the developing nations as deforestation and poor land management practices continue at an alarming rate. Well then, how can we as PCVs build sound bridges to cross to the other side? What follows is a type of manual to be used in building your bridge. We have not supplied you with any parts or blueprints because each bridge has to be built differently, just as all situations are different. The construction is up to you as an individual, but we have supplied you with what we believe to be the most important element in bridge building: IDEAS. Use what follows as may be appropriate. Happy bridge building!

Resources for Extension

The most valuable resource for extension work is yourself. Your educational background, your variety of work experiences, and your broad base of knowledge from reading is something for which many volunteers do not give themselves credit. The ability to think and plan, and to process problems logically, is a valuable skill to share with people. Besides yourself, there is within every community an infrastructure of knowledgeable people. Utilize those persons who already know the local plants and trees. Also there are trained agency employees for many aspects of extension topics. Another group of resource people can be found through international development agencies, including Peace Corps. Use your human resources.

You can improve your resourceful value through research. There is a variety of printed materials available through various agencies both national and international. Books, magazines, and newsletter publications are available, although you may have to search them out by getting on mailing lists and requesting subscriptions through your local agency or Peace Corps program. Also you can exchange materials with other people in your field. This material also needs to be made available to your extension staff and the campesinos. A good project is to translate technical works into simple pamphlets and posters for distribution in the community. Use the resources available and be a resource yourself.

Extension Methods

There are many vehicles available to an extensionist. Each person needs to try out different ways and choose the ones which are best suited for the situation according to resources available and personal style. Be innovative in trying new ways, keep variety in your presentations, and share successful teaching tools with others in the field.

Examples of effective techniques include slide show presentations, public demonstrations, giving classes in the community and schools, signs and posters, showing movies, demonstration plots with labels, newspaper articles and other written information, and personal contacts with individuals in their fields. There are more.

The level of effectiveness rises with concrete demonstrations. Seeing is believing, doing is learning. "Mingas" or cooperative projects are more likely to be seen and trusted. To effect a change, the value must be made clear. Emphasize the concrete-financial-benefits for planting. Show multiple use of a windbreak for firewood, shelter, future poles, as well as erosion control. Included in your training resources should be a variety of simple demonstrations such as the soil boxes to demonstrate erosion control.

Using the Formal School Systems

The key to the future is education of the youth. The school system enables the extensionist to reach the next generation of landowners in an atmosphere of learning. Generally school kids are curious and eager to learn, and you will reap rewards from those children with whom you work.

First steps of contact need to be with the school administration or through a teacher. Most will be open to your proposals of classroom help or with projects of school woodlots, viveros, or gardens. You will need to start out by building a base of trust and cooperation with your counterpart teacher and nurture that relationship to ensure future teaching opportunities.

You do not have to be a trained school teacher to conduct basic classes in conservation and forestry. Using your best extension techniques, keep them scaled to the learning level of the class. Remember, most school teaching situations are more formal in developing countries than your own. Perhaps you can observe a class and work closely with the teacher. Prepare lesson plans in triplicate - one for your cooperative teacher, one for your records, and one to share with other volunteers through your Peace Corps program.

Invest in the future by teaching. Help increase awareness and understanding at the grass roots level in schools. It will be rewarding for you and the national goals in conservation and forestry.

Informal Teaching Situations

As an extensionist, you must learn to be open and take advantage of informal teaching situations. Many of your best opportunities will occur spontaneously when you least expect them. Do not be so into your own structured program that you overlook other excellent possibilities to promote extension. Extension is always dynamic, meaning that it is a continuous process. You cannot shut it off and on. Remember this, always try to set a good example and be as accessible as possible to your community. Your own personal dedication and actions are powerful teaching techniques. Use them to your advantage. Remember that actions speak louder than words, especially in your first few months at your site when your language skills may be minimal (or nonexistent). Speak through your actions - a universal language.

Personal Contact

Personal contact is vital to forestry extension. Remember, you are someone new and different and you must let people get to know and understand just who you are. The best way to do this is to talk personally with as many people as possible. Communication is almost totally word of mouth in developing nations, unlike the U.S. where we depend on newspapers, books, TV and radio. Also it will be obvious that you are interested in the community when you take the time and effort to talk personally with individuals. Teach them through personal contact when practical and possible.

Confusion Extension

As an extension agent you must make a major effort not only to advise the community of how to improve its forestry and agricultural techniques, but to explain why there are problems, how they develop, and how they impact on things living in the environment. These concepts can be extremely complex to explain. An important rule to remember is "keep things simple." Explain one specific point at a time, using concrete examples. Try to keep a logical progression, expanding when you are sure the ground work has been laid.

For example, the loss of nutrients occurs both when topsoil is lost through erosion and when crops use up the nutrients as they grow. Therefore, soil fertility can be maintained by erosion control, crop rotation, use of N-fixing plants, and fertilizing. Each one of these needs to be broken down into separate lessons, such as separate demonstrations regarding different types of erosion control measures. The level of frustration decreases with the level of simplicity. Do not be an agent of confusion.

Qualities of the Forestry Extensionist

- Creates his/her message with community in mind.
- Flexible enough to take advantage of spontaneous opportunities to advance forestry extension.
- Is dedicated to the community and forestry profession.
- Keeps his/her message simple, clear and to the point.
- Uses resources available in the community.
- Provides for continuation of forestry extension after he/she leaves.
- Continues self-education in the field.
- Seeks the advice of members of the community.
- Is an available and easily accessible resource to the community.
- Creates free time for his/her mental health.

Peace Corps Volunteers Mark Jackson
and Bill Stenett prepared this article.

I. Proposal for Native Forest Woodlot Management

Throughout tropical America, native forests are disappearing at an alarming rate. Tropical America is said to contain approximately 590,000,000 hectares of closed tropical forest, well over half of the world's tropical biome. If current accelerating trends continue, up to 307,000,000 hectares of this forest could possibly be lost to deforestation by the year 2,000. In Paraguay alone, an estimated 200,000 hectares of primary subtropical forests are destroyed each year. The eastern high forests of Paraguay, which contain some of the world's most valuable timber species, are expected to disappear, except in isolated patches before 1990. That same threat lies over the coastal forests of Ecuador, Columbia, Venezuela and Brazil, and to a lesser extent, Amazonia.

So, here we are in 1981. What, as land conservationists working in these tropical/subtropical areas, are we able to do to stem the proverbial rising tide of deforestation? First of all we must realize that in many areas deforestation is a necessary evil needed to convert forest lands to agricultural purposes for many of the world's landless population. Many tropical and subtropical areas have demonstrated that with proper soil mangement practices (i.e., agrosilviculture, contour plowing), they are able to support sustained yield crops. The problem begins when marginal lands (those lying on steep slopes or along rivers and streams), or areas in the humid tropics which receive more than 3,000mm of annual rainfall, (e.g., Napo River area, Ecuador), are cleared of the natural forest and converted to monocultural situations. These areas quickly prove to be susceptible to an acceleration of soil compaction and erosion leading to abandonment of sites within a few years.

Let us examine the situation of the watershed of the Panama River along the Paraguayan/Brazilian/Argentinian border as a case in point. This is an area of roughly 5,000 square kilometers which has recently come under heavy colonization pressure. The Panama River Valley is said to contain the richest hardwood forest in the western hemisphere in terms of value per hectare of standing timber. The forests are rapidly being felled with the principle conversion being to agriculture. This use is not sustainable unless strict soil conservation and management is practiced. Destruction of the mixed hardwood forest is causing a negative ecological impact. The soils are agricultural in nature, - alluvial, deep and well drained. However, total removal of forest cover on steep slopes or along critical watersheds leads to wind, water and solar erosion, heavy siltation of rivers and streams and a dramatic drop in the water table. It has been estimated that conversion of the area to agriculture, while leaving 30 - 50% of the forest intact, would probably alleviate many of these problems. In many areas primary and secondary forests still exist on steep slopes and along waterways. This is usually the case on small landholdings between 5 - 30 hectares, where campesino owners have left these remnant patches until available time, labor and money allow for these areas to also be converted to agricultural use. It is with these "marginal" lands

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still remaining in the forest that Peace Corps volunteers, working in land conservation, could concentrate their efforts. By offering the campesino landowner a forest land use plan for the management of his woodlands as a woodlot or "Arboleda", thousands of scattered hectares of forestlands could be saved from conversion. These scatterings of remnant forests could constitute a significant proportion of Paraguay's future forest reserve.

It is recognized that many problems arise in the promotion of long-term land use plans to campesinos whose vision usually does not extend past the next planting season. These difficulties can be overcome by appealing to the campesino on an intellectual level, offering him genuine "facts" on the long range economic value of woodlot management along with the immediate returns and benefits to be realized year round, i.e.; continual source of firewood and lumber for personal use. Then compare woodlot use to other land uses. On a personal level discuss the future security of sons and daughters or even his own old age security. Fortunately, economics will, in the long run, be the ultimate promoter of the value of woodlot management; as the scarcity of first class wood grows, the value of residual stands increases. The Paraguayan high forest can be managed in 30 year rotations producing as much as 115m^3/hectares of high grade timber each rotation. Therefore, the management of indigenous forestlands should be viewed as a viable and legitimate land use.

The campesino who spends half his life beating back the forest so that he can plant his crops, traditionally thinks of the forest as an enemy. When he sees forested land, he sees land that is being "wasted" or "not used"; land that is unproductive and should be cleared and planted. Many campesinos view their cleared fields as a sign to the community that they are hard workers who utilize their land: a cleared field is a symbol of progress. Here the volunteer conservationist has the opportunity to teach the benefits and economic value of woodlot management. If forestlands can be shown to have a legitimate land use, it would be viewed as land not wasted, but rather as an integral part of a farm's complete "integrated land use plan."

The objective of this paper is to arm the volunteer with the theory and practice of native forest management in the tropics, so that he or she can carry these ideas to the campo and promote them. Many of the silvicultural techniques used in managing an ecosystem as complex and dynamic as the neotropical forest are still poorly understood and yet untried. But in the case of Paraguay, as well as many other Latin American countries, where the time for promoting forest land conservation and management is limited to just the next couple of years, the time to start is now. Time is too short to wait until stand increment and individual species growth studies are concluded and published. Enough information is available in most tropical countries to be applied in a sound management scheme. The important consideration is that eventual impact on the land will be positive and not negative, because management should do nothing but improve forest land productivity in the long run. Because we are working in most cases, with rotations of 25 - 40 years, there is much time to improve management techniques or practice. Therefore, it is of litle importance that our silviculture is foolproof from the beginning. What is important is that the campesino landowner recognizes the importance of woodlot management and sets aside land (marginal or otherwise) for an "Arboleda."

II. A Woodlot Management Scheme

As most tropical ecologists know managing an ecosystem as dynamic and complex as the neotropical forest can be a difficult and frustrating experience. Trying to manage these forests on a sustained yield basis can be even more so. Presented here is a management program developed for a Paraguayan subtropical humid forest woodlot. It may be that it cannot be applied in all or even most tropical/subtropical forest situations. It is simply offered as a guideline for possible ideas for application where a management plan might be needed and utilized.

The Theory of Tropical Forest Management

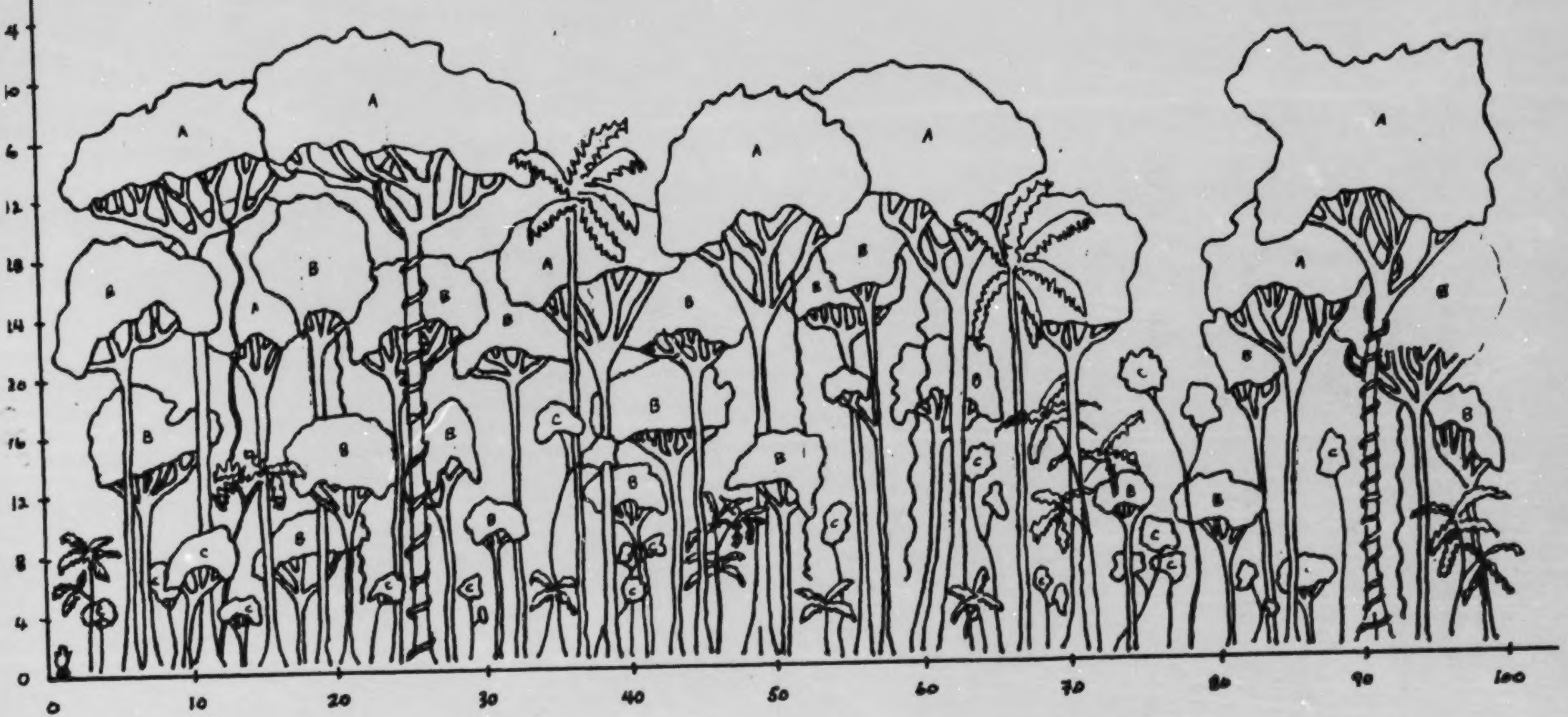
The theory of this management plan is based on the proposition that a tree like "Lapacho" (*Tabebuia ipe*) from the time of germination in the natural forest needs more than 100 years to mature to a marketable size of 60 cm in diameter at breast height (dbh). But this same tree could reach the same size in less than 60 years if the forest in which the Lapacho is growing is "managed." What is meant by managed is that a cleaning of the forest understory or a "Limpieza del Monte" is employed to eliminate weeds, shrubs and lianas (epiphytes) that compete and supress the growth of the valuable species like Lapacho.

When looking at a forest profile we can identify 3 diameter classes in a natural stand:

1) the dominante and co-dominant trees of the 40 cm and larger trees,

2) the juvenile and standard size trees of the 10 - 40 cm class,

3) the seedlings and saplings of the 0 - 10 cm class.


4
10
6
12
18
14
20
16
12
8
4
0
0
10
20
30
40
50
60
70
80
90
100
A
B
C

SCALE REPRESENTS 10 × 100 METERS

A: > 40 cm dbh

B= 10 to 40 cm dbh

C = < 10 cm dbh

(Fig. 66)

IDEALIZED PROFILE SHOWING THE DIAMETER CLASSES. SUBTROPICAL HUMID FOREST, ITAPÚA, PARAGUAY.

Since we can see that the natural forest is a dynamic, ever growing system, we realize that if we were to remove the largest trees in the forest (all the trees of the greater than 40 cm class) the two smaller diameter classes would remain to recover and grow to dominante positions in the forest canopy, and could be harvested at a future date. In other words, the forest is managed on a "sustained yield" basis. While it may take a Lapacho 60 years to grow from germination to a mature size in the managed stand it would take only 30 years for the middle diameter class to grow to a mature size. Therefore, our woodlot is managed in 30 year cutting or harvest cycles (there are 30 years between each harvest of mature trees).

When discussing woodlot management with the campesino landowner not too much emphasis should be placed on these harvests every 30 years. The more immediate benefits should be highlighted. For example, one hectare of managed woodlot is able to provide a continual annual source of firewood to a family or community using only the dead standing or sound fallen trees without ever cutting a live tree. Lumber for house building or other construction projects could be obtained from a campesino's own private woodlot, and it would not be necessary to call upon expensive outside resources for materials. Other products to be realized are tool handles, fence posts, fruits, orchids, latex, medicinal plants and drug extracts, game animals and parrots. All are renewable within a reasonable period of time after conservative harvesting. By cultivation of the forest the production of many of these living things can be substantially increased. The establishment of plantations of Palmito (Enterpe edulis) in the forest understory is a good example. Palmito occurs naturally in the forest understory. The terminal portion of it's growing stem is used as a food condiment and is considered a delicacy. As many as 100 plants/ hectare could be planted in a woodlot, integrated with tree enrichment plantings, and harvested after 15 years of growth.

Lastly, with the rapid rate of deforestation the value of a harvest each 30 years will increase the importance of some of the world's most valuable hardwoods.

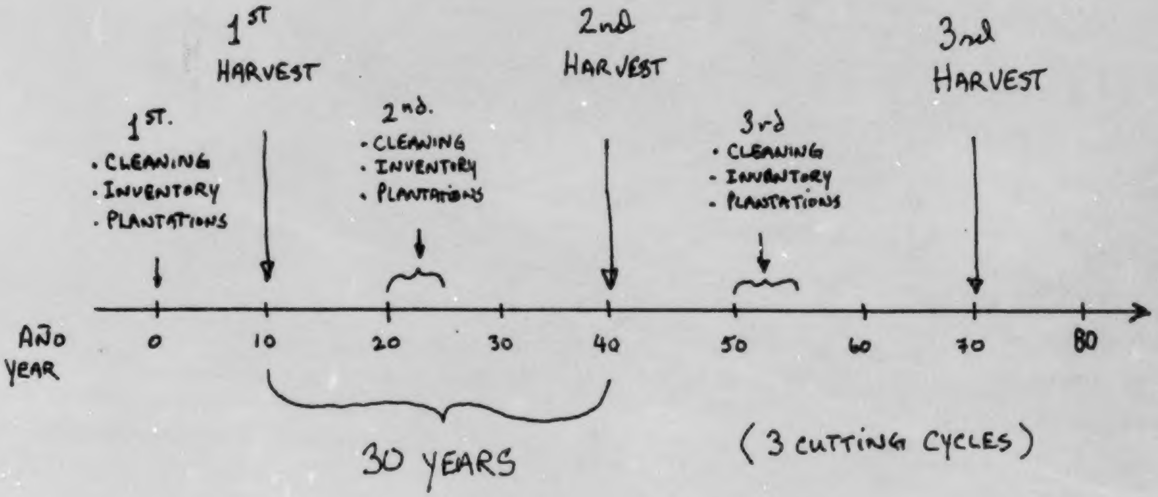
It has been estimated that the natural forest can support from 100 to 150 large trees of the greater than 40 cm class per hectare. Rarely is this density of stocking found in the natural forest due to competition from a variety of weed trees, herbacious plants, and shrub species. Therefore, the objective of a forest management program is to eliminate competing species and to maintain optimum stocking of valuable timber in each diameter class. The forest manager should try and maintain the stocking of the less than 10 cm class at 300 saplings/hectare and of the 10 - 40 cm class at least 150 juvenile trees/hectare. This will ensure that at least 100 trees of the greater than 40 cm class will be harvested each 30 years from each hectare.

The forest management program is divided into 4 parts:

1. the clearing of the forest understory ("Limpieaz del Norte")

2. the forest inventory,
3. the enrichment plantings,
4. the selective harvest.

A time-line of these steps might appear as such:


1st HARVEST
2nd HARVEST
3rd HARVEST
1st.
• CLEANING
• INVENTORY
• PLANTATIONS
2nd.
• CLEANING
• INVENTORY
• PLANTATIONS
3rd
• CLEANING
• INVENTORY
• PLANTATIONS
AÑO
YEAR
0
10
20
30
40
50
60
70
80
30 YEARS
(3 CUTTING CYCLES)

(Fig. 67)

The first 3 steps, the clearing of the forest understory, the forest inventory and the enrichment plantations are usually employed together. In this way the inventory and the plantings can follow the understory clearings, taking advantage of the freedom of access and movement created by the clearings. The harvest is made as a seperate step usually taking place 10 to 30 years after the first 3 steps are done. In Paraguay it is recommended that the winter months between May and August are employed for this work. During these months campesinos have less work in the field and thus could devote more time working in the woodlot. Also the winter temperatures are more comfortable for this heavy work and there is considerably less danger of snake and insect bites to workers.

Before beginning the first steps of the management program the location of each managed hectare (or managed "unit" if areas less than one hectare are used) in the woodlot should be well established and marked with painted posts in each corner. A crude map will facilitate future record keeping of inventories and planning or scheduling of future harvests. A 10 meter buffer strip of natural (uncleared) forest should be left on the outside boundaries of the woodlot. The advantages of this practice are:

1. to protect the cleared area from strong winds,

2. to form a natural fence against livestock entrance,

3. to maintain shade within the closed canopy to prevent the entrance of sunlight that would stimulate new weed growth within the cleared area.

The Forest Clearing

The clearing of the forest understory of unwanted vegetation is the first step in the management program. A clearing involves the elimination of all species of shrubs, herbacious plants and lianas (Epiphyte climbus) that have no value as wood materials, firewood, or medicinal or edible plants. This unwanted vegetation competes with the regeneration of valuable wood species and suppresses their development. The clearing will also stimulate new regeneration of trees and growth of released seedlings.

There are, principally, 5 to 10 species of plants that form 90% of the thick growth in the forest understory. In trying to identify the seedlings of the various valuable wood species (some 300 of them), it is more practical to learn to recognize the 5 to 10 "weed" species that you want to eliminate. Another reason for utilizing this approach is that inexperienced campesinos can be quickly trained to identify these few weed species for removal when learning to employ forest clearings in their woodlots. It has been determined that between 85 to 110 work hours (or 3 persons working 2½ days) are needed to learn well one hectare. This estimate depends on the thickness of growth in the forest understory and the level of experience of the workers. The clearing should open up much area of greater solar penetration, stimulating new vegetation and also giving growth opportunity to supressed seedlings to grow above competition. If the clearing is well done it needs only to be applied once every cutting cycle (every 30 years). This is because the function of the clearing is not to be "maintained" but only to provide the initial stimulus for regeneration and release. After a forest is harvested, with the largest trees being removed (all these within the greater than 40 cm class), there is usually a period of thick vegetative growth in the forest understory stimulated by the opening of the canopy. Within 5 to 15 years the middle class should have grown to dominante position and begun to again shade the understory strata, supressing the thick growth of weed species. At this point (10 - 15 years after harvest) another clearing should be applied to eliminate weed competition and stimulate new tree growth. Thus, the sustained cutting would start over again (see time-line diagram).

The Inventory

After finishing the clearing of the forest understory you will have easy access to the remaining trees, making this the ideal time to take stock or inventory of what type of trees are inside your woodlot. An inventory will tell you the quality of the trees in each diameter class. Two people taking a 100% inventory (all the trees larger than 1 meter in height are counter) should be able to finish one hectare in less than 2 hours. One person identifying and measuring the diameters and the other person noting the date on an inventory sheet, make the most efficient team. Length of marketable bole/tree can also be recorded and used later with local volume table to calculate volume of wood/hectare.

A simplified inventory sheet could be used with campesinos to record only the number of trees of each species in each diameter class.

Hectare #1

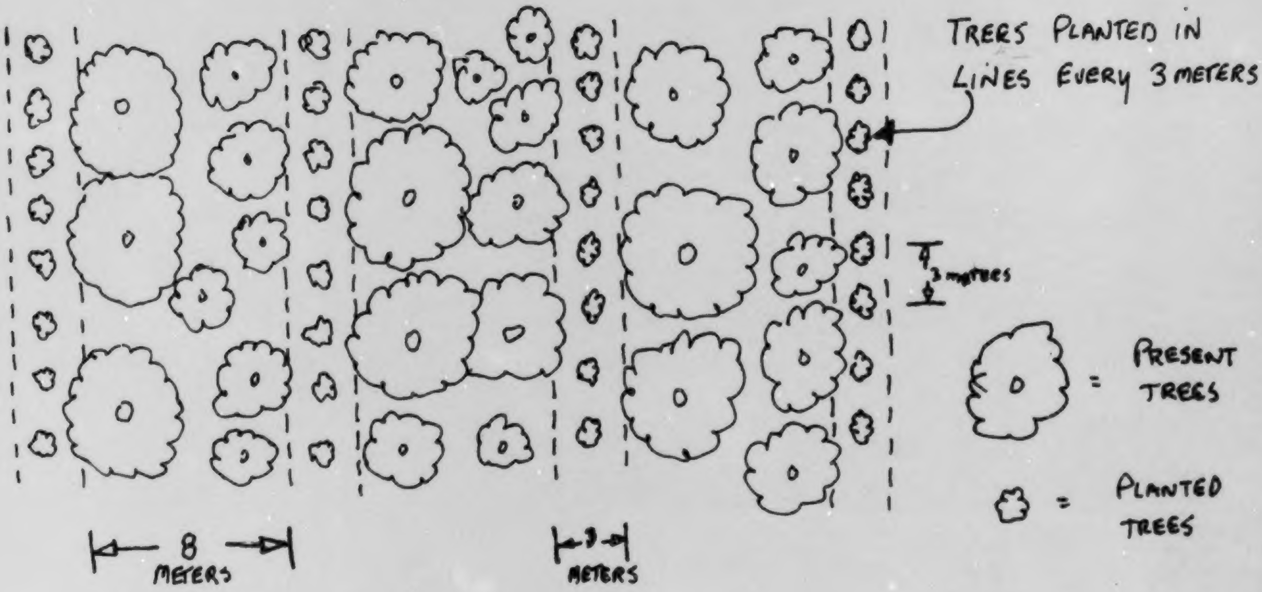
SPECIES	<10cm dbh	10-40cm dbh	>40cm dbh
CEDRO	90	13	13
LAPACHO	—	—	2
GUATAMBÚ	113	18	9
LAUREL	—	5	8
TOTAL	203	36	32

(Fig. 68)

This is the easiest system and it gives the campesino owner a good idea of the quality of growing stock he has per hectare in each diameter class of his woodlot. During the inventory notes should be taken to indicate forest gaps or other areas where regeneration may or may not be naturally present.

The Enrichment Plantings

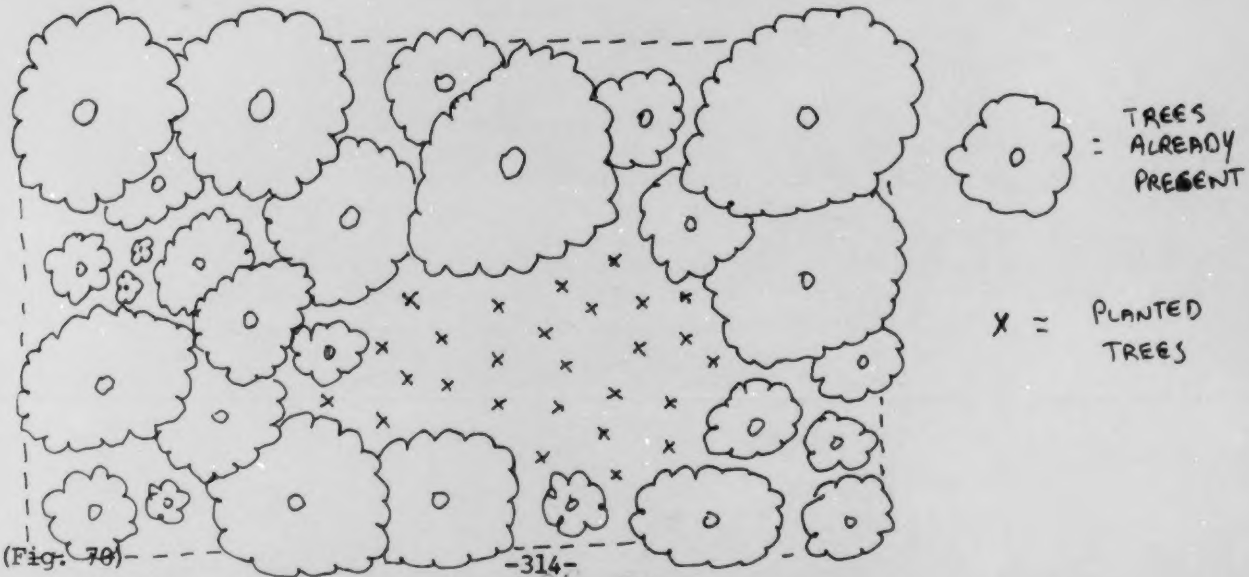
From the inventory, it may become evident that the stocking of the lower diameter classes may be so inadequate that complete stocking at maturity (greater than 100 trees/hectare) will not be achieved, or maybe a specific valuable species does not naturally regenerate well and a greater density is desired. In these cases the supplemental plantings of nursery grown seedlings is recommended. "Enrichment plantings" will increase the stocking in the 0-10cm class and up-grade the quality of timber in your woodlot. Two methods of enrichment plantings are employed. One system is the planting of seedlings in systematic rows or lines. A radius of 1 meter is cleared to the bare soil around each plant to eliminate competition.


TREES PLANTED IN LINES EVERY 3 METERS
3 meters
= PRESENT TREES
= PLANTED TREES
8 METERS
3 METERS

(Fig. 69)

This system is used when improved stocking is desired, and it assures the even distribution of the plantings throughout the area.

Another system is the planting of individual trees in gaps or large openings under dense canopy where natural regeneration may be lacking. The site situation should determine the species of trees planted (i.e., shade intolerant species planted in forest gaps; shade tolerant species planted in dense shade).


= TREES ALREADY PRESENT
X = PLANTED TREES

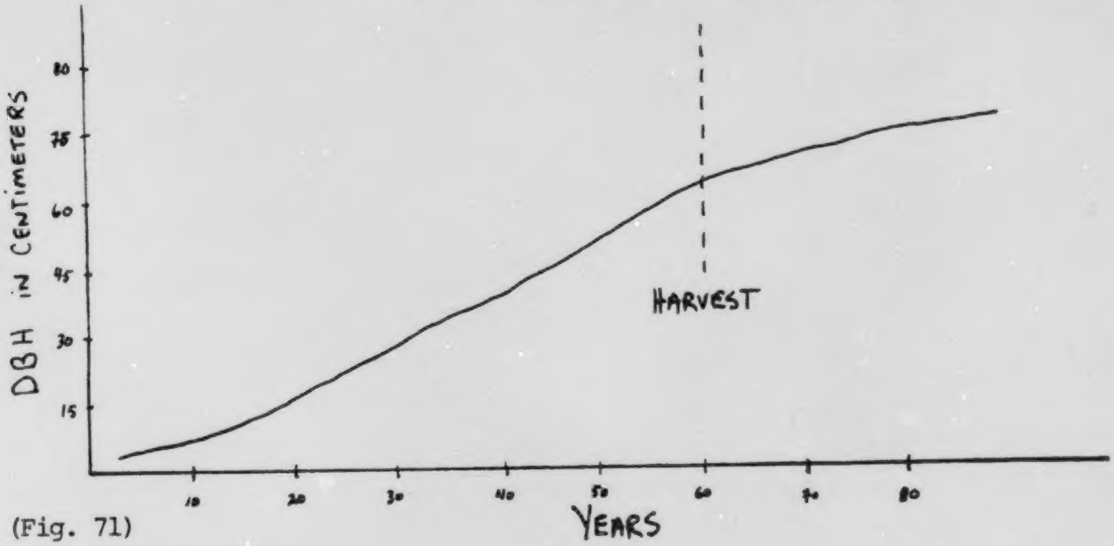
(Fig. 70)

The Selective Harvest

The harvest marks the end of each cutting cycle or management rotation. A "selective" harvest is the removal of all the mature trees of the 40cm class and larger, leaving the 2 smaller diameter classes (less than 10cm and 10-40cm class) to recuperate, grow, and be harvested in the future. It is this way that a forest is managed on a "sustained yield" basis.

"All species harvest" practices are becoming more and more common place in tropical areas as wider uses for second and third class woods are being discovered. One example is the development of "chips" (woodchips) utilization plants for the production of particle board. The practice of all species utilization can mean greater utilization of wood resources and greater earnings for the campesino woodlot owner if the forest is managed on a rotational or sustained yield basis. Also, many light hardwoods generally ignored in today's wood market may come into greater utilization as veneer manufacturing becomes more widespread.

To understand the theory of a selective harvest, it is first necessary to understand the growth rate of a forest tree during its lifetime. The first 60 years are the years of most vigorous growth. After this age, growth takes place very slowly.



(Fig. 71)

While a Lapacho tree may need only 60 years to grow to a size of 60 cm in diameter, to grow another 20 to 80 cm in diameter would require another 50 years. It can be seen that after reaching about 60 cm in diameter most trees begin to lose their economic cost effectiveness. Also, once a tree begins to lose its vigor it also becomes less resistant to insects and disease attacks. An example of this can be seen in the development of heartrot disease in large trees like Yuyra-pyta (Peltophorum dibium). Therefore, trees are scheduled to be harvested when they grow to be 40 to 80 cm in diameter and for this reason, you find very few over mature trees larger than 80 cm in diameter in a well managed woodlot.

Careful consideration is important when selecting trees to be marked for harvest at the end of each cycle. The removal of trees before they reach maturity (in most cases trees smaller than 40 cm in diameter but is very species specific) could result in earnings to future harvest. A few considerations for the selection are:

1. The distinct characteristics of each tree should be considered in each site. For example, a tree of certain characteristics might be removed in one stand, but following the type or condition of the trees of another stand, a tree of the same species might be left to the next harvest.

2. The form and condition of the tree is considered. A tree of poor growth form should be removed before maturity. The opening produced will stimulate new growth.

3. The species of the tree should also be considered because there are great differences between species growth rates and sizes at maturity. For example, a Timbo (Enterolobium contorlisilquum) of 40cm in diameter is still considered a young tree; left to grow for another 30 years, it would grow to a size of 80 to 90 cm in diameter. But a Lapacho (Tabebuia ipi) of 40 cm in diameter would hardly grow to a size of 60 cm in diameter given another 30 years. Therefore, the Lapacho might be harvested at 40 cm in diameter and the Timbo left for another growth cycle.

4. A few large trees of the valuable species with good growth form should be left in the stand to provide a seed source for future natural regeneration.

Following this basic management program the volunteer conservationist can design a woodlot management plan in a form which will best meet the needs of the campesino landowner in his area and at the same time be preserving a resource that will become increasingly important each year.

Peace Corps Volunteers Robert and Terry Simeone contributed to this exercise.

EXOTIC vs. INDIGENOUS SPECIES

This issue concerns whether exotic species of trees should be planted in place of indigenous species. Foresters and people around the world are confronted with this question. The decisions made should be based on all available information because they carry long range consequences.

In many countries throughout the world, exotic species are favored over the indigenous species. In some countries, it is an issue over which environmentalists fight as they see the indigenous forests disappearing in favor of exotic species that are more commercially attractive (e.g. Pinus radiata in Australia). Initially, exotic species were transportad around the world with the expansion and migration of human populations. Many species were unsuited to their new environments and failed to grow. Others expressed a different phenotype within their new environment. An interesting example of this is Pinus radiata - a species indigenous to Monterey, California. In its indigenous environment, it is a tree of poor form and quality and is considered a non-commercial species. Outside of its indigenous environment, it grows straight and fast in countries such as Australia, New Zealand, and South Africa, and in some countries in Latin America. In these countries, Pinus radiata is an important commercial species. Eucalyptus is another interesting example of the use of exotic trees. Eucalyptus is a genus of trees indigenous to Australia and contains over 500 different species. However, within a relatively short period of time, species of the genus have been planted in countries around the world. At the present, there are more Eucalyptus trees growing outside of Australia than within.

Exotic species are favored over indigenous species for a variety of reasons. Economics is probably the main one. Some exotic species simply grow faster and attain commercial value sooner than the local indigenous species. They may be of superior quality for certain products that the indigenous species are not adapted for (i.e., pulp and paper). In some cases, exotic species are better suited to the site than the indigenous species. This can occur in areas where the indigenous trees have been cleared years ago through poor agricultural practices and over-grazing of the soil has altered it to the point that it will no longer support the indigenous species. Exotic species can be used in these areas for erosion control and for soil rehabilitation. An example of this is the use of ecualyptus for the control of desertification in some African countries. The scarcity of fuelwood is a major problem in some parts of the world, and it is getting worse each year with expanding populations. The slow growing indigenous species cannot keep up with the demand for fuelwood. The immediate answer may lie in the establishment of woodlots with fast growing exotic species. Also the establishment of exotic fruit and nut trees could improve the diets of the local people and can open up new markets for a cash crop. On an everyday level, throughout the world, exotic trees are used extensively as horticultural species. Many have a high aesthetic value and are found as shade trees around homes and within cities and parks.

On the negative side, when indigenous forests are cut and replaced with exotic species, the resulting forest is basically a desert with respect to the indigenous flora and fauna. The natural ecology of the area is drasticallly modified. Not only are the indigenous flora and fauna eliminated but the basic chemical composition of the soil is changed. Another point to consider is that most exotics are planted as monocultures and could fall prey to disease or insect attack.

The decision of whether to plant exotic species vs. indigenous species must be based on the specific site and the existing conditions. The pros and cons must be weighed. What are your objectives and what will the long range effects be?

In Summary - There is no easy answer when it comes to deciding whether to use exotic over indigenous species. The decision made must be based on each specific site. What are your objectives and what will the long range consequences be? The trade-offs associated with your decisions must be carefully weighed.

EXOTICS vs INDIGENOUS - ECUADOR

Ecuador's coastal region stretches north-south, bordered by the Pacific Ocean to the west and the Andes chain to the east. The forest types vary from tropical to sub-tropical dry. Certain areas in the coast, most notably Los Rios province, have some of the most fertile soil in the world. Consequently, the region is very rich both in agriculture and forests. There is an extensive variety of indigenous trees in the coastal area. The indigenous species serves a wide variety of purposes and are very important to the Ecuadorian economy. There are two general wood categories, "madera buena" and "madera blanca."

There are numerous high quality madera buena species. Some of these are *Cordia alliodora,* Laures; *Cedrela odorata*, Cedro; *Tabebuia chrysantha*, Guayaium; and *Sweitinia* sp., Caoba. These species are prized for furniture, parquet floors, and other products requiring a fine, hard wood. Madera blanca is used for building houses and general construction. Ecuador provided 95% of the balsa used by the world before lightweight plastics became popular. Cana guadua is another wood product important to the coastal economy. It is used by the campesinos for cheap construction.

The varied indigenous trees of the coastal region are a rich natural resource. They provide the costanos with the raw material from which an infinite variety of wood products can be manufactured.

In the west where conditions are optimum for growth, fast growing exotic species are sometimes more economically appropriate than indigenous species. In recent years numerous exotic species have been introduced into Ecuador's coastal region. *Tectona grandis*, (Teca) is a high quality exotic species that is favored over indigenous ones of the same quality because of its rapid growth rate.

Other exotic species of particular interest are the trees of the family Leguminosae. The trees of this family provide a wide range of services to the environment they inhabit. Legumes are nitrogen fixers, their presence greatly improves soil fertility. These trees are extremely swift growers, providing varied wood products in a very short time. Legumes are adaptable to a wide range of site and soil conditions. They reproduce well and are easily cultivated. In addition to this, they are used as ornamentals and for shade. Legumes often provide food for animals (in the form of leaf forage and/or pods), and particular species provide food for human consumption. Legumes have exceptional recommendations for their exploitation in the hospitable environment of the coast. But the economic benefits exotic species provide need to be weighed against the possible deleterious effects of introducing exotic species into a different environment.

Monoculture plantations are one of the easiest methods of exotic species exploitation. When planting in a monoculture certain risks are taken. The introduced species brings with it none of the natural predator controls that exists in its indigenous environment. A pure stand of exotics is susceptible to disease and insect infestation. Insects and diseases can rapidly spread through a pure stand causing considerable damage to the species.

The original forest is often destroyed to make way for the monoculture plantation. Destruction of the indigenous forest can have far-reaching and often little understood effects on the local environment. When the indigenous forest is removed the habitat for many plants and animals is removed with it. In the environment of the sub-tropical and tropical forests, plants and animals have specialized niches. If the forest habitat is destroyed, it often cannot be replaced, and displaced plant and animal life may perish. This in turn may cause other environmental problems, for example, the depletion of certain gene pools. Deforestation is a leading cause of species extinction.

Some exotics are weed species in their natural environment. In a new environment there is potential for unchecked growth, taking over and crowding out ecologically important indigenous species.

Indigenous and exotic species both have an important place in Ecuador's coast. The ramifications of indigenous and exotic species exploitation on the ecology of the coast needs to be given serious consideration. Before decisions determining species use are made, trade-offs may be necessary for the region's ecology and economy.

EXOTIC vs. INDIGENOUS SPECIES - PARAGUAY

In Paraguay, the forests are being depleted at alarming rates. If these rates continue, it is estimated that within the next fifteen to twenty years, Paraguay will have no indigenous forests remaining. Through this accelerated deforestation, the country will encounter problems such as massive soil erosion, wood scarcity, loss of habitat to local flora and fauna and a lowering of the watertable.

The Servicio Forestal Nacional (SFN) which was formed nearly ten years ago, is aware of the deforestation but is moving slowly in taking steps towards reforestation. Servicio Forestal Nacional is interested in exotic species which grow rapidly. They have planted approximately 5,000 ha of experimental plantations using three exotic species; Araucaria angustifalia (Kiri'y), Pinus alliottii (Slash Pine), and Pinus taeda (Loblolly Pine), as well as various species of Eucalyptus. The format used to establish these plantations was based on models used in Brazil and Argentina. Both Brazil and Argentina currently have the market as well as the technology necessary for these types of tree species. However, at present there is no market within Paraguay for the products of these plantations and hopefully, they will be exported to Brazil or Argentina. This in turn creates an economic problem. Paraguay, being landlocked, has a rather underdeveloped transporation system. With exhorbitant prices for fuel, the need to transport timber to outside markets is a costly expenditure. Also, the government has passed a law stating that whole logs cannot be exported. To date, this project does not have a very high priority and the plantations have not been efficiently managed. If Paraguay was to build mills for paper or particle board, and carefully manage these plantations, the mature trees could be processed within the country. The plantations then could prove to be valuable. However, without proper management interest, the exotic species that are currently growing will continue to be in poor condition and will have no significant economic value.

On the other hand, the existing indigenous species are very hardy, grow well in their respective sites, and are useful within Paraguay. Most of the indigenous forest species grow rapidly, have a high quality wood, and there is a strong market demand for them. They are used for construction purposes, firewood, furniture, ornamentation, etc. Paraguay has the necessary sawmills to reap the economic benefits of indigenous species.

Environmentally, the use of indigenous species in reforestation is a sound measure. Using species which have existed naturally for years, maintains the wide diversity of indigenous flora and fauna. They will also retain the natural soil structure and chemical composition. These indigenous species have been growing in Paraguay for centuries and have achieved a dynamic equilibrium with their environment.

Thus, specifically for Paraguay, future reforestation efforts should concentrate more on the country's existing indigenous species rather than bringing in exotic species, based on economic and environmental reasons.

Peace Corps Volunteers Peter Gould,
Jennifer Alderman, Patrick T. Evans
contributed to the articles on Exotic
vs. Indigenous Species.

Forestry for Community Development

Assuming that most Peace Corps Forestry volunteers will be working with rural, small-scale farmers and small landowners, the forestry volunteer must be conscious of the specific needs and problems that affect the forest and land use of the Third World.

"Forestry for community development must reflect the needs, problems and aspirations of local people as seen through their eyes. To be truly appropriate its strategy will vary according to community and place"[1].

If the volunteer is to be a catalyst for judicious forest and land management in his or her community, he/she must consider a number of critical factors.

The volunteer can teach simple methods of forest and land management to rural land owners. In this way, the campesino can determine his own land resources and assess the results of reforestation projects or other remedial measures on his land. Forest inventory is also necessary if the volunteer or other extension agent is to determine the extent of deforestation in the area.

The volunteer must stress the needs for the complete evaluation of rural lands, so that the campesino can learn to determine what would be the most appropriate uses of his land. A relatively simple land evaluation could prevent forested areas from being cleared for livestock grazing or other agricultural activities when the land is inappropriate for those purposes.

The campesino must learn to consider soil quality and type, topography, land fragility, flora, fauna, water resources, and local cultural factors, such as economic conditions and pressures which are affecting him. It is important that the volunteer impresses upon the rural farmer the number of options from which he may be able to choose. Depending upon the land characteristics, forest resources, and local socio-economic conditions, the land may be used for intensive agriculture, grazing, forest plantations, agro-forestry, multiple-use systems, mining, parks, wildlife, refuges, ecological reserves and other uses.

Several factors may affect the volunteer's success at promoting proper land use. Local professionals (land use planners, etc.) must be willing to act as resources to rural campesinos and apply their techniques in the field. It is important that local administrative agencies are effective in ensuring that land is actually allocated and used appropriately. Incentives are needed initially to stimulate proper land use. Most important, and perhaps most difficult is acquiring the acceptance and commitment of the members of the rural community.

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[1] Forestry For Rural Communities. FAO Forestry Department Pg. 8.

The forestry volunteer must stress the importance of protecting and conserving the existing soils and watershed systems which are so critical to the livelihood of rural farmers. The campesino must be aware of the need for protective measures against slope erosion, the detrimental effects of wind on deforested or semi-arid areas, and the problems created by stream siltation, resevoir sedimentation, and torrential water flow in steep, mountainous areas.

The volunteer should promote soil conservation techniques that can utilize and be combined with the growing of crops and trees and the production of other valuable resources. In this way, the rural farmer can keep his land under production and protect it at the same time. In semi-arid and arid regions, the PCV can instruct farmers in the construction of shelter belts and other structures that can stabilize sand dunes, which if left unchecked, would inundate agricultural areas.

One hectare of tropical forest may contain as many as 100 tree species, but only a small number are now exploited for commercial use. With such a low density of commercial species, there has been very little economic stimulus for sustained management of tropical forest areas.

Thus, it is important for the tropical forestry volunteer to introduce techniques for managing and more efficiently utilizing tropical forest stands. He or she can teach simple criteria for selecting crop trees for exploitation, control measures for unwanted vegetation, insects, and plant pathogens; principles of seed selection and storage, and methods of reforestation. The campesino must be encouraged to use harvesting techniques that protect remaining trees and enhance forest regeneration.

Because many, if not most, rural communities face very marginal economic situations, it is critical that the volunteer promotes proper management techniques and better utilization of forest resources in order to realize more of the economic potential of the forest. The campesino must be made aware of the value of many non-traditional forest species.

If forest resources are to be conserved and/or restored, carefully developed site-specific reforestation plans must be implemented.

The volunteer must be aware that it may not be possible or desirable to restore the original tree and plant species to a given area. It may be more judicious to introduce species that are known to grow rapidly and reliably.

The selected reforestation species must be well suited to the local ecological conditions. Reforestation will fail if the introduced species cannot adapt to the soil, water, climatic or other environmental factors critical to its survival.

The PCV should teach the campesino proper seedling care and other measures necessary to ensure successful reforestation (proper pruning, etc.). Nursery management, seed collection, storage, and treatment; seedling transport, care and planting techniques are all skills that the volunteer can transfer to the campesino so that he can independently sustain reforestation on his own land.

The campesino should be encouraged to reforest with trees that serve multi-purpose. He should be made aware that a reforestation system that not only controls wind and water erosion, but also provides food, animal fodder, fuel, and wood products such as lumber and pulpwood is not only desirable, but possible.

The method of reforestation involves the establishment of managed tree plantations of one or more species. Such a system could provide fuel and timber, and relieve the exploitation pressures on the natural forests in the area. Research has shown that a successful tropical plantation could supply 4-10 times the amount of usable wood produced in the natural tropical forest. Plantations could also be labor-intensive and serve as an economic stimulus in high unemployment areas.

However, the forestry volunteer must examine the situation very carefully before he or she proposes a monoculture plantation for a rural community. The specific sensitivities of the proposed species to the site and climate must be determined beforehand. The clearing of a natural forest in order to make way for a plantation is not recommended because the conversion of a very diverse forest to a monoculture could potentially create an ecosystem highly susceptible to disease and insect infestation. It could be a catalyst for soil deterioration and consequently other ecological and socio-economic problems.

It is especially valuable for the forestry PCV to teach the rural farmer methods of conserving the forestry and land resources which he has. It is critical that the campesino learns how to reduce heat losses during firewood burning, as well as methods of cutting waste and tree loss during forestry and wood-processing operations.

Rural families must be made aware of the inefficiency of heating and cooking, using open fires as compared to contained heating units. Stoves could be designed much more efficiently and still remain simple. The Lorena stove is one example of a much more efficient heating device that could be built and used by rural families. Many traditional wood and charcoal burning systems in use today have heat losses that approach 60%. Charcoal should be discouraged as a fuel because a great deal of heat energy is lost during the conversion of wood to charcoal.

The campesino must be encouraged to reduce his waste during timber harvesting. The selective exploitation of only a few species frequently leaves residual trees damaged. Much wood is wasted when the tree limbs and tops are cut off and left to rot in the forest.

The volunteer should be aware that an all-species rather than selective harvesting could cause deforestation and lead to more traumatic effects on the environment than traditional, selective harvesting. However, if properly managed, a system involving clear cutting, and all-species harvesting, combined with well-managed reforestation, could meet a community's wood needs, while reducing the exploitation pressures on remaining forests.

Because so much wood waste occurs during processing at sawmills, the volunteer must promote the use of improved technologies (where affordable), to reduce wood losses during milling and other wood-processing operations. The use of the entire tree should be encouraged.

By demonstrating better transport and storage methods for rough logs and lumber, the PCV can show the campesino how he can cut his losses due to mold, stains, insects, splitting, decay, improper drying methods, and mechanical damage caused by poor handling methods.

By introducing methods of wood preservation, the volunteer can teach a community how to prolong the life of wood products such as telephone poles (where applicable), fences, stakes, etc. Better preservation of lower quality woods would reduce the demand for more durable woods for these purposes. Consequently, the higher quality woods could be saved for more critical uses.

In agricultural areas, the forestry volunteer should promote agro-forestry practices as a means of making the land more productive, and conserving its resources at the same time. The campesino should be made aware that by planting trees together with food crops, or by rotating trees and crops he can maintain his land in a constantly productive state, without draining or destroying the land's productivity.

Successful agro-forestry systems can reduce the need for forest removal in two ways. It will eliminate the need for shifting cultivation (which usually entails more deforestation), because land that is utilizing agro-forestry should remain productive. It will reduce the need for more clearing of forests in order to increase food production. A well planned agro-forestry system should enable a rural family to be self-sufficient in the basic food, fuel, and lumber needs.

To meet better a rural community's lumber and energy needs, the forestry volunteer can organize the establishment of a community woodlot. This will require a major effort in community organization by the volunteer. The people themselves must feel the need for the woodlot. There must be strong public support of the project, and a community-wide willingness to share in the planning, establishment, maintenance, and benefits of the woodlot. Without this popular support, a community woodlot will have little chance for success.

Changes in the attitude and habits of local government officials may be needed as well. It may be difficult for these officials to accept the idea of a community taking the initiative and organizing a major project themselves. The PCV should always be conscious of the political problems that are involved.

The forestry volunteer can reduce deforestation for fuel purposes by introducing simple, low cost energy alternatives to his or her community. Solar, wind, bio-gas, and mini-hydro-power may all be possible depending on the specific conditions at the site. Such energy systems would greatly increase a campesino's self-sufficiency, and greatly reduce his need for firewood. For example, solar dryers could be used for agricultural products such as grain, meat, fish, and tobacco, instead of depleting the local wood supply for fuel.

By showing the vast quantities of resources in the forest other than wood, the PCV may be able to convince the rural farmer that it makes poor economic sense to cut down the forest. The economic value of forest fruits, nuts, herbs, aquatic and terrestrial animals should be highly publicized.

Since many forestry volunteers may be in extensive livestock areas, it is important that the PCV be aware of the factors involved in managing a range to ensure conservation of the range resources as well as maximum livestock production. The campesino must be made aware that if he desires a sustained yield of livestock over a long period of time, he must consider several factors.

1. The selection of the most suitable kind of livestock for the land available.
2. The recognition of the proper seasons of grazing.
3. The degree of range use, including the proper distribution of animals over the range.
4. Available water resources for animals.
5. Protection of livestock from illness or injury.
6. Available forage crops. Livestock production can only be sustained by conservation use of forage crops.

Changes in the forest environment may have a significant effect on wildlife habitats. Thus, the Peace Corps forester may find himself working in wildlife management as well.

In order to manage a forest judiciously for its wildlife resources, as well as its timber and land productivity, the forester must be able to recognize the wildlife species present, their populations, and understand their life histories. This knowledge will enable the Peace Corps volunteer, or the campesino to determine what forest practices improve the environment for wildlife and what activities disturb it. For wildlife production and protection, the rural farmer needs to know the positive and negative effects to aquatic and terrestrial animals of such practices as pruning, clearing, thinning, and timber cutting.

The forestry volunteer may find that the most difficult part of his or her work will not be in actual physical labor, but rather, in extension. The volunteer may have to overcome a great deal of cultural and social resistance before successfully convincing the members of the rural community of the need for planting trees, and proper land management.

The volunteer can use intellectual and economic arguments to make his case. He can demonstrate that an early and continued harvest is possible with integrated (forestry and agriculture) production techniques. The PCV can compare the income potential of tree planting with other uses. Often tree planting requires less capital and can be as fast an income producer as certain agricultural crops or livestock. It may require three to five years for a farmer to realize a profit on a new cattle herd.

The campesino should know that trees can be security in old age. By performing the physical labor when young, he can be assured of a good income to provide for his old age. It should be pointed out to rural farmers that while few people plant trees, those who do usually realize a very good profit.

The volunteer can also use a more personal approach to extension. He or she can emphasize to the campesino that in several years, his children will be attending school. Trees planted now can pay for his children's education.

The volunteer can ask the rural farmer directly what provisions he has made for his old age? What will he do if he or his family is ill and needs medicine but has no income with which to pay? Trees planted now would provide some insurance against such a situation.

Every volunteer will have a different personal style for extension. The only correct method is the method which works well for you and for the community in which you are working. The volunteer should carefully consider what style and approach will achieve the most success in his or her community.

Peace Corps Volunteer Daniel
Saxon contributed this article.

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SESSION XLIX

Spanish Language

Total Time: 1½ hours

This is the last Spanish session before a week long field trip. Instructor may want to review assignments, check charla progress and give special assignments to trainees who need continued practice.

Procedures

Time	Activities
	1. Review assignments,
	2. Check charla progress,
	3. Go over vocabulary,
	4. Have trainees form sentences using vocabulary list.

Vocabulary

Raw material - materia prenia
Log - traza, tronco, rollo rollizo
Lumber (sawn wood) - madera, aserada
To saw - aserrar
To plane (wood) - cepillar
Top chip (wood) - astillar
Chip (wood) astilla
Veneer - chapa
Plywood - contra chapodo
Cellulose - celulasa
Pulp - pulpa
Fiberboard - madera aglomerada
Press board - madera prensada
Moulding - moldaduara
Board - tabla
Plank - tablón
Saw blade - hojo de sierra
Panels - paneles
Kraft paper - papel kraft
Box, drawer - cojón
Waste - desperdicio

SESSION L

Field Trip Overview

Total Time: 1½ hours

Goals:

- To review objectives of field trip.
- To go over schedule for field trips.
- Answer questions concerning field trips.
- Trainees set personal learning goals for field trip.

Objectives

The objectives for field trip(s) are presented in this session. The schedule of where and when trainees will be on field trip is carefully gone over. All questions are answered concerning objectives, schedule, meals and lodging. Trainees set personal learning goals for field trip.

Exercise I: Trainer(s) give overview of field trip.

Materials: Shedule for field trip. Flip charts, marker pens, tape.

SESSION L

Exercise I

Total Time: 1½ hours

Overview

Trainer(s) give overview of following week's field trip(s) including, schedule, objectives and details concerning housing and meals. Trainees set personal learning goals for field trip.

Procedures

Time	Activities
1½ hours	1. Trainer(s) give overview of field trip(s). 2. Trainees individually set personal learning goals. 3. In small groups they discuss their learning goals and make contracts with each other for reaching goals during field trip i.e., speaking Spanish at least 1 hour a day might be someone's goal. They could contract with another to speak with them.

OBJECTIVES OF THE FIELD TRIP

Objectives of the field trip are the following:

1. Forest Extension - Using techniques discussed in the classroom to practice actual forestry extension by visiting small farmers and/or colonists and trying to interest them in forestry projects.
2. To reinforce classroom and practical trainng in setting up a nursery by visiting several nurseries in the tropics, observing and learning applicable techniques.
3. To become acquainted first hand with the tropic species and the ecological environment in which they are present in the forests.
4. To observe the tropical forests from the standpoint of forest management taking into account ecological considerations.
5. To observe the rate and effects of deforestation by colonists and large timber concessions. To also become acquainted with their attitudes about forestry issues and how they have dealt with forestry problems.
6. To observe plantations of exotic species and become aware of the problems (now and in the future) and the successes.
7. To observe and become aware of how the provincial forestry offices operate and their acutal (operational) relationship to the head office.
8. To continue to develop communicative skills especially those related to forestry subjects by actually conversing in Spanish with a cross-section of the country's population.
9. Through conversataions with government officials, small farmers and forestry company employees, to become acquainted first hand with the attitudes and barriers that impede forestry projects; and to become acquainted with possible solutions for dealing effectively with such attitudes and barriers.
10. To observe monocultures from the standpoint of the ecological and economic impact they might have on the community and country.
11. To investigate cooperatives as a means of introducing forestry projects.
12. To have an understanding of agricultural crops and their potential as related to agro-forestry projects.

OVERVIEW

The purpose of the field trip(s) is to give trainees the chance to practice extension: To approach techniques by actually talking with farmers. The field trip also reinforces classroom and practical training in setting up a nursery. Different species of trees are seen in their ecological environment. Forest management is observed from the standpoint of ecological considerations. First hand observation of the effects of deforestation by colonists and large timber concessions are shown to trainees. Trainees will also visit several plantations of exotic species and become aware of the problems and the successes of plantations. Participants will have the opportunity to converse with many government officials about forestry issues and research projects in which they are engaged. If possible, trainees will converse with cooperative members and observe cooperative ventures. Agricultural crops will be investigated and their potential for agro-forestry projects will be discussed by trainers.

Trainer's Note

We have listed schedules for one Sierra field trip and one tropical field trip. We encourage trainers to get as many confirmations as possible and have back-up sites in mind in case something falls through.

A session to review the day's activities should be held each evening during the field trip.

TROPICAL FIELD TRIP

Monday, November 30

1. Visit to Monterrey Pine plantation of Ingeniero Sotomayor. Discussions with him concerning silviculture and economics of stand. Discussions of future plans for incorporating a silvo pastoral system into his farm management. Observation of pasture management techniques and terracing. Observation of pathological and insect damage to forest stand.

2. Observation of changing vegetation types from high sierra to humid tropic. Discussion on man's impact; clearing and burning for establishing agricultural crops and pasture on steep slopes. Identification of some of the basic forest species (cecropia, spp, Cordia alliodora). Observations of an agro-forestry system (Cordia, Bananas, & Coffee).

3. Arrived Rancho Ronald

4. Volleyball games

Tuesday, December 1

1. Met Ingeniero Rosero at Provincial Ministry of Agriculture office in Santo Domingo. Accompanied him to Ministry of Agriculture nursery.

2. Charla by Ingeniero Rosero on;
   a. forestry history of area,
   b. forestry program,
   c. changing climatic conditions caused by deforestation,
   d. obstacles in implementation of a successful forestry program.

3. Nursery seed bed discussion and demonstration (trainee participation).
   a. making seed beds
   b. seed collection
   c. seed treatment
   d. sowing
   e. problems & solutions
      - aphids - spraying
      - control of soil micro-organisms - vapor
      - weed control - spraying
      - managing bud worm - no solution
   f. preparing seedlings for outplanting - making seudo estacas.
   g. methods of outplanting seudo-estacas.
   h. disucssion on possible use of containers for seedling production of tropical species.

4. Discussions on species produced in the nursery: (Cordia, Cedro, Pachaco, Cordia negro, Teca).
   a. guayacan
   b. growth rates - fast growing exotics
   c. economic possibilities

   d. ecological requirements

5. Lunch with Ingeniero Rosero.

6. Visit to stand of Cordia Alliadora on a marginal site:
   a. poor stem growth
   b. need of species for site with good soil conditions
   c. spacing requirements for species
   d. efforts to improve stand by thinning and economic aspects for use of thinnings

7. Visit to commercial stand of Balsa:
   a. stand establishment: Direct seeding and early thinning
   b. growth rates
   c. economic aspects: markets, prices, etc.
   d. problems - depletion of nutrients in soil - possible need for fertilizers

8. Return to Rancho Ronald - Dinner.

9. Review of day's (and previous day's) activities.

10. Charla tropical forest management.

11. Group discussion: Ecuador - Paraguay.

Wednesday, December 2

1. Charla (continuation) of forest management.

2. Purchasing food for lunch in field - buying fruit etc. at local market.

3. Met with local Ministry of Agriculture officials and PCV working in Quininde.

4. Visit to co-op nursery - Lack of care and weeding. Discussion on establishment of nursery: Ministry of Agriculture-Coop arrangement. No co-op member was present for discussion as had been planned. Observation of natural Balsa regeneration.

5. Observations of recent logging and conversion of land to coffee and agricultural crops.

6. Observation and discussion of African Oil Palm monocultures over extensive areas. (500 ha). Nematodes, blight - epidemic potential.

7. Visit to Emdesa nursery.
   a. Seed bed preparation; fertilization.
   b. Problem Mahogany bud worm in Cedro.
   c. Observed species in nursery; Teca, Guayacan, Cordia, Cedro, Pachaco, Pinus patula, Pinus radiata, and Pinus caribea.

8. Lunch along river; bird watching.

9. Visit to (1200 ha) stand and observed forest management practices to establish regeneration in cut-over stand:
   a. elimination of annuals and undesirable forests species
   b. inventory of regeneration - determination of stocking level
   c. inter-planting with Cordia and Guayacon
   d. elimination by weeding of annuals
   e. monitoring results

10. Visit to tropical forest recently logged over:
   a. observation of tropical species and growing habitat
   b. buttressing
   c. discussions on tropical wildlife: birds, monkeys, lions, etc.

11. Rancho Ronald (Arrived 9:30 PM)
   Dinner and then retired for evening.

Thursday, December 3.

1. Purchase of food at local market for lunch in field.

2. Met Ministry of Agriculture officials at provincial office in Santo Domingo. (2 officials could not attend as planned) - left to attend co-op meeting and practice forest extension:
   a. meeting did not materialize
   b. discussion by Ministry of Agriculture officials on how (how not to) conduct extension
      - little contact or knowledge with people by Ministry of Agriculture,
      - No follow-up of previous projects, - eliciting responses that agree with Ministry of Agriculture extensionist's goals,
      - pasture better than forests.

3. Observations of cutover areas ±3 km both sides of newly located road.

4. Clearing of cutover areas for agriculture crops: large scale commerical mechanized production possible.
   a. loss of nutrients through leaching
   b. water and wind erosion

5. Visit to small sawmill. Observations on:
   a. poor utilization
   b. type of machinery, lack of safety
   c. economics: purchasing standing timber; selling saw boards.
   d. production of non-dimensional stock.

6. Swimming - in river; interaction with local swimmers.

7. Return to Rancho Ronald.

8. Volleyball game.

9. Charla on watershed management.

10. Review day's activities.

11. Group discussions: Ecuador, Paraguay.

Friday, December 4

1. Visit to Pichilingue agricultural experiment station and observations of:
   - a. use of Teca as live fence posts
   - b. agro-forestry
     - coffee/guayamba
     - coffee/laural
     - cacao/laural
     - cacao/rachaco - poor
     - guayacan and teca plantations.
2. Visit to Quenedo; purchase of food at local market for lunch in country.
3. Lunch and swimming
4. Observation of changing vegetative types and changing climatic types (high fog) from tropical forests to paramo grass (high elevation - sierra).
5. Dinner and overnight at Latacunga.

Saturday, December 5

1. Visit to local market in morning.
2. Meeting with Ministry of Agriculture officials; observations of:
   - a. species trials (no records available)
   - b. insect (detoiliator) and biological controls
   - c. mixed plantation (patula & radiata)
     - spacing
     - effects of thinning and pruning
   - d. leader and top die-back
   - e. Cypress plantation - failure
3. Visit to Cotopaxi National Park.

Lecture on National Park and ecological reserves systems

a. Park management and programs,

b. problems: controlling exotics, hunting tourist flow,

c. environmental/educational problems.

4. Return to Quito.

Ecology Teams Give Presentations

Total Time: 4 hours

Goals:

- For each team to give presentations which they have prepared for use in their geographic area.
- Trainers do summary of ecological issues and discuss trade offs.

Overview

The objective of this session is to have trainees give presentation concerning ecology that they would possibly give at their site. Trainer gives some of his/her own insights concerning ecology.

Exercise I   Ecology team presentations; trainer responses.

Materials - Trainee previously-prepared ecology presentations.

SESSION LI

Exercise I: Ecology Team Presentation   Trainer Responses

Total Time: 4 hours

Overview

Trainees present scenario: "There is a great deal we do not know about our environment." Presentations have been put together for use at their sites. Ecology team is composed of trainees from similar climate and elevations.

Procedures

Time	Activities
approximately 30 min. each	1. Trainee who has a special project is to manage this group of presentations, and introduces session. Each team gives presentation.
	2. Trainer gives following response to presentation. Outline follows.
	1.1 Begin with any project in the community development area; well construction, school gardens, agro-forestry, village woodlots, etc. Any community activity will, in one form or another, affect the environment somehow. Especially if "environment" is understood in its broadest form, not only the physical aspects are felt but also health, economics, social and cultural components.
	A project normally is designed with specific results in mind. An attempt is made to provide well defined, "targeted" inputs to bring about some improvement to the people in the field. What is less clear is the nature and extent of incidental consequences; these activities which might bring about less desirable, or adverse or negative results.

In reality, more often than not the good will have to be taken with some bad. Choices often involve trade-offs. The challenge then consists of developing a system where trade-offs are as favorable as possible to the people involved.

SESSION LII

Individual Interviews

Same as Session 19.

SESSION LIII

Review of Field Trips

Total Time:

Goals:

- For trainees to look at the objectives of the field trip to determine if they have been met.
- For trainees to be able to give an overview of their experiences while on the field trip.
- To be given the assignment "The role of the Forestry Volunteer...A Transition to Peace Corps Service."

Overview

In this session trainees look at their field trip(s) experience and the objectives of the field trip and post on newsprint their findings. The field trip groups report their findings to each other. They receive their final assignment to write an essay about the role of the forestry volunteer, a transition to Peace Corps Service.

Exercise I: Checking objectives of field trip.

Materials: Objectives of field trip(s), flip charts, marker pens, tape.

SESSION LIII

Exercise I: Checking Objectives of Field Trip

Total Time: 1½ hours

Overview

Trainees now have completed one week of field work and observations, they now take time to see how well they reached the objectives of the field trip. They also share the experience with others who did not accompany them.

Procedures

Time	Activities
45 minutes	1. Trainees review the objectives of the field trip, going through each one to see how well they were met. Findings are posted on newsprint.
30 minutes	2. Trainees select members of their group to present findings. Presentations are made.
	3. Trainer summarizes findings of all groups.
	4. The trainer then gives the assignment "The Role of the Forestry Volunteer - A Transition to Peace Corps Service."

THE ROLE OF THE FORESTRY VOLUNTEER
A TRANSITION TO PEACE CORPS SERVICE

Please present a clear, thoughtful, and concise description of your perception of your role as a Peace Corps Volunteer. Include the following points for consideration:

- Your definition of forestry service in Peace Corps,
- Your understanding of the job or project to which you have been assigned,
- The manner in which you have been prepared by this training program,
- Your honest appraisals of your skills in physical cognitive and social areas,
- The limitations you perceive in your abilities and in the potential job situation,
- Methods you will consider to encourage the active participation and inclusion of all community members affected by your project,
- How your job or project may contribute to improving the quality of life of people affected,
- Methods you plan to use for effective community involvement in the application of forestry technologies and extension techniques.

The description should be prepared carefully, and should reflect your philosophy and current perspective in training and Peace Corps service. A copy of your paper will be given to you to take with you. It will be interesting to review and compare with your realities and job situation a year from now.

Project Planning: Goal Setting

Total Time: 4 hours

Goals:

- To integrate the technical material, problems identified and personal learnings into a clarified set of personal and project goals and objectives.
- To write immediate project goals and those in three months.
- To identify and list resources needed to accomplish goals.
- To identify personal learning goals for the next three months.
- Review learnings of and accomplishments in last 15 weeks of training.

Exercise I: Lecture on goals, objectives and activities.

Individual work on three month project plan.

Individual work on personal learning.

Materials Flip charts, marker pens, tape. Participants may want to bring their journals.

Trainer's Note: You may want to suggest that participants bring their journals to this exercise.

SESSION LIV

Exercise I: Project Planning, Goal Setting

Total Time: 4 hours

Overview

In this session trainees take time to plan their projects and set their own goals. They will deal with integrating the training they have received, problems that have been identified and personal learnings. They will also look at accomplishments they have made since the beginning of training in-country.

Procedures

Time Activities

1. Trainer opens the session by explaining the goals of the session; making linkages to the prior sesssions will now stress their role as a volunteer. All the information they have gathered over the past 14 weeks is to be incorporated into a series of plans for the future.

2. Ask each person to review and list their major learnings during training.

3. Ask each person to review the learning goals they have set for themselves in session five. Now put into a written statement, if they have reached these goals.

4. Ask each person to then fill out the following matrix. Explain that the exercise has two parts. The first considers the specific volunteer project assignment. The second part asks people to set out goals for personal learning or development.

   a. Where would I like to be on my project in 3 months?

Goals	To Do's	By When	Resources Needed

   b. Benchmarks (or milestones)

   To get to my next 3 month goals, I plan to have accomplished the followng in 6 weeks:

Objective	To Do's	By When	Resources Needed

c. When I get to my site, I plan to do the following things first.

Goals	To do's	By when	Resources Needed

5. After the exercise is completed, ask the
group to review the "goals", "to do's" and
"resources needed" in pairs. Remind the
1 hour group that this is another opportunity
to use their planning skills and apply
them to this situation. Use the
following questions.

- Is the plan realistic, feasible?

- What will I do to measure success?

15 minutes BREAK

6. Personal learning/action goals: Ask
each person to look over their journal
entries and the chart they made earlier
20 minutes and consider what they want to set as
personal learning or action goals for
the next three months.

7. When the list is completed, ask the
group to go back into the same pairs
30 minutes again and review each person's plan.
The group should be instructed to share
only what they feel comfortable sharing.
Some areas may be private.

8. Close the session by asking:

1) What have you learned from this
process?
15 minutes

2) Is there any unfinished business?

3) Will you be able to apply these tools
in your work with the community?

FORESTRY TECHNICAL TRAINING

ECUADOR/PARAGUAY

Introduction to Planning (Sample Outline for Lecture)

1. The ability to plan is a key characteristic of a professional.

   A. Need for Planning:

      1. Necessary for effective Peace Corps Service.
      2. Neccessary for most host country agencies.
      3. Underdevelopment is as much due to poor planning as it is to resource limitations.

   B. The planning process begins with the establishment of clear objectives.

II. The formation of clear useful objectives.

   A. The need for clear objectives.

      1. The desired outcome of the project must be clear to plan necessary activites and tasks.
      2. Evaluation of project effectiveness requires clear objectives.

   B. The qualities of meaningfully stated objectives.

      1. They identify in concrete terms the terminal project situation or behavior and give a picture of what should exist at the end of the project.

      2. They identify any pertinent conditions or assumptions that would affect the achievement of the project objectives.

         o To forewarn participants of any possible problems.

         o To avoid misunderstandings when objectives are not met due to outside factors.

      3. They specify the criteria used to establish acceptable project performance, giving a statement of specific quality, quantity or time necessary for fulfillment.

      4. They are stated in concrete non-ambiguous terms:

         a. Terms often used in objectives that are open to many interpretations.

- TO MOTIVATE people to plant trees,
- TO TRAIN people in nursery management,
- TO UNDERSTAND the essentials of nursery management,
- TO ENCOURAGE tree planting.

b. Terms open to fewer interpretations:

- TO ESTABLISH a nursery capable of producing 100,000 healthy trees each year.
- After participating in the training course participants will be able: TO DESCRIBE AND DEMONSTRATE the following essential skills of a forester.
- After training they will be able TO MAKE A LIST of most common pests and diseases found in nurseries.

SESSION LV

Spanish Language

Total Time: 1½ hours

Overview

In this session trainees present to the instructor and each other charlas they have prepared for use in the field. Instructors and other trainees give presenter feedback on content, pronunciation and manner in which they presented the charla. Trainees have been encouraged to use illustrations and other visual aids.

Procedures

Time	Activities
5 minute presentation	1. Each trainee is to give a full 5 minute charla on some aspect of forestry in host country. This charla can be a simple set of instructions on how to do something, i.e., thinning, gully plug or why the host country has a forestry program.
10 minutes feedback	2. Each participant is given feed-back on content, pronunciation, and manner in which they presented charla.

SESSION LVI

Resources

Total Time: Open

Goals:

- Restate the importance of local resources so that trainees can register this statement again.
- Identify local resources, where to find them, how to approach them.
- National resource identification.
  International resource identification.

Overview

What happens when volunteer really needs outside help? Have they looked at all the alternatives? Human? Monetary? In this session we once again dwell on finding local resources and then move to locating outside help. The implications of bringing in outside help are explored. The where, who, how, and how to locate funds is explained in detail.

Exercise I: Lecture on resources

Materials: Flip chart, marker pens, tape

Optional:
1. Article by E.F. Schumacher
2. Catalogs, guidelines, newsletters from funding sources for display and perusal by trainees.

SESSION LVI

Exercise I: Lecture on Resources

Total Time: Open

Overview

This exercise reemphasizes the importance of looking within your own communty first, having absolutely exhausted community resources, what to do next, who to go to and how to ask.

Procedures

Time | Activities

1. Trainer gives a lecture on resources using following outline posted on newsprint.

1.1 Do your really need outside help?

a. Have you exhausted local solutions?

b. What are the implications of outside help?

1. Dependency
2. Non-support of local potential
3. Creativity

c. Schumacher

Development depends on people not resources.

1.2 If you really need help:
a. What sources are available?

1. $ $ $ $ $
2. In kind material,
   equipment,
   supplies.
3. Information/technical assistance

b. What sources?

LOCAL

Private: clubs, service organizations, professional associations, churches,

Government: local, national.

2. INTERNATIONAL

Private: Development groups, universities

Government: UNDP-FAO, AID, Peace Corps ICE, British, Swiss, USDA Experimental Station, Puerto Rico.

1.3 How to find out about them?

a. Curiosity, creativity.
b. Clearinghouse - TAICH, Catalogs-FAO, USDA, Newsletters.
c. Write - Wait.

1.4 How to get the most?

a. Be aware of their
   - o speciality,
   - o interest.

b. Follow their system or format.

c. Advance by stages.

2. If available, a display of newsletters, catalogs and funding guidelines should be displayed for participants to browse through.

Trainer's Note: If no one on the training staff feels comfortable with this lecture, you could probably convince the PTO from Peace Corps to do this one.

DEVELOPMENT

by

E. F. Schumacher
(from: Small is Beautiful)

A British Government White Paper on Overseas Development some years ago stated the aims of foreign aid as follows:

> To do what lies within our power to help the developing countries to provide their people with the material opportunities for using their talents, of living a full and happy life and steadily improving their lot.

It may be doubtful whether equally optimistic language would be used today, but the basic philosophy remains the same. There is, perhaps, some disillusionment: The task turns out to be much harder than may have been thought--and the newly independent countries are finding the same. Two phenomena, in particular, are giving rise to world-wide concern--mass unemployment and mass migration into cities. For two-thirds of mankind, the aim of a "full and happy life" with steady improvements of their lot, if not actually receding, seems to be as far away as ever. So we had better have a new look at the whole problem.

Many people are having a new look and some say the trouble is that there is too little aid. They admit that there are many unhealthy and disrupting tendencies but suggest that with more massive aid one ought to be able to overcompensate them. If the available aid cannot be massive enough for everybody, they suggest that it should be concentrated on the countries where the promise of success seems most credible. Not surprisingly, this proposal has failed to win general acceptance.

One of the unhealthy and disruptive tendencies in virtually all developing countries is the emergence, in an ever more accentuated form, of the "dual economy," in which there are two different patterns of living as widely separated from each other as two different worlds. It is not a matter of some people being rich and others being poor, both being united by a common way of life: It is a matter of two ways of life existing side by side in such a manner that even the humblest member of the one disposes of a daily income which is a high multiple of the income accruing to even the hardest working member of the other. The social and political tensions arising from the dual economy are too obvious to require description.

In the dual economy of a typical developing country, we may find fifteen per cent of the population in the modern sector, mainly confined to one or two big cities. The other eighty-five per cent exists in the rural areas and the small towns. For reasons which will be discussed, most of the development efforts goes into the big cities, which means that eighty five per cent of the population are largely bypassed. What is to become of them? Simply to assume that the modern sector in the big cities will grow until it has absorbed almost the entire population--which, is of course, what has happened in many of the highly developed countries--is utterly unrealistic. Even the richest countries are groaning under the burden which such a maldistribution of population inevitably imposes.

In every branch of modern thought, the concept of "evolution" plays a central role. Not so in development economies, although the words "development" and "evolution" would seem to be virtually synonymous. Whatever may be the merit of the theory of evolution in specific cases, it certainly reflects our experience of economics and technical development. Let us imagine a visit to a modern industrial establishment, say a great refinery. As we walk around in its vastness, through all its fantastic complexity, we might well wonder how it was possible for the human mind to conceive such a thing. What an immensity of knowledge, ingenuity, and experience is here incarnated in equipment! How is it possible? The answer is that it did not spring ready-made out of any persons's mind--it came by a process of evolution. It started quite simply, then this was added and that was modified, and so the whole thing became more and more complex. But even what we actually see in this refinery is only, as we might say, the tip of the iceberg.

What we cannot see on our visit is far greater than what we can see: The immensity and complexity of the arrangements that allow crude oil to flow into the refinery and ensure that a multitude of consignments of refined products, properly prepared, packed and labelled, reaches innumerable consumers through a most elaborate distribution system. All this we cannot see. Nor can we see the intellectual achievements behind the planning, the organizing, the financing and marketing. Least of all can we see the great educational background which is the precondition of all extending from primary school to university and specialized research establishments, and without which nothing of what we actually see would be there. As I said, the visitor sees only the tip of the iceberg; there is ten times as much somewhere else, which he cannot see, and without the "ten", the "one" is worthless. And if the "ten" is not supplied by the country or society in which the refinery has been erected, either the refinery simply does not work or it is, in fact, a foreign body depending for most of its life on some other society. Now, all this is easily forgotten, because the modern tendency is to see and become conscious of only the visible and to forget the invisible things that are making the visible possible and keep it going.

Could it be that the relative failure of aid, or at least our disappointment with the effectiveness of aid, has something to do with our materialist philosophy which makes us liable to overlook the most important precondition of success, which are generally invisible? Or if we do not entirely overlook them, we tend to treat them just as we treat material things--things that can be planned and scheduled and purchased with money according to some all-comprehensive develoment plan. In other words, we tend to think of development, not in terms of evolution, but in terms of creation.

Our scientists incessantly tell us with the utmost assurance that everything around us has evolved by small mutations sieved out through natural selection. Even the Almighty is not credited with having been able to create anything complex. Every complexity, we are told, is the result of evolution. Yet our development planners seem to think that they can do better than the Almighty, that they can create the most complex things at one throw by a process called planning, letting Athene spring, not out of the head of Zeus, but out of nothingness, fully armed, resplendent, and viable.

Now, of course, extraordinary and unfitting things can occassionally be done. One can successfully carry out a project here or there. It is always possible to create small ultra-modern islands in a pre-industrial society. But such islands will then have to be defended, like fortresses, and provisioned, as it were by helicopter from far away, or they will be flooded by the surrounding sea. Whatever happens, whether they do well or badly, they produce the "dual economy" of which I have spoken. They cannot be integrated into the surrounding society, and tend to destroy its cohesion.

We may observe in passing that similar tendencies are at work even in some of the richest countries, where they manifest as a trend toward excessive urbanization, toward "megalopolis", and leave, in the midst of affluence, large pockets of poverty-stricken people, "drop-outs," unemployed and unemployables.

Until recently, the development experts rarely referred to the dual economy and its twin evils of mass unemployment and mass migration into cities. When they did so, they merely deplored them and treated them as transitional. Meanwhile, it has become widely recognized that time alone will not be the healer. On the contrary, the dual economy, unless consciously counteracted, produces what I have called a "process of mutual poisoning," whereby successful industrial development in the cities destroys the economic structure of the hinterland, and the hinterland takes its revenge by mass migration into the cities, poisoning them and making them utterly unmanageable. Forward estimates made by the World Health Organization and by experts like Kingsley Davies predict cities of twenty, forty and sixty million inhabitants, a prospect of "immiseration" for multitudes of people that staggers the imagination.

Is there an alternative? That the developing countries cannot do without a modern sector, particularly where they are in direct contact with the rich countries, is hardly open to doubt. What needs to be questioned is the implicit assumption that the modern sector can be expanded to absorb virtually the entire population and that this can be done fairly quickly. The ruling philosophy of development over the last twenty years has been: "What is best for the rich must be best for the poor." This belief has been carried to truly astonishing lengths, as can be seen by inspecting the list of developing countries in which the Americans and their allies and in some cases also the Russians have found it necessary and wait to establish "peaceful" nuclear reactors--Taiwan, South Korea, Philippines, Vietnam, Thailand, Indonesia, Iran, Turkey, Portugal, Venezuela--all of them countries whose overwhelming problems are agriculture and the rejuvenation of rural life, since the great majority of their poverty-stricken peoples live in rural areas.

The starting point of all our considerations is poverty, or rather, a degree of poverty which means misery, and degrades and stultifies the human person; and our first task is to recognize and understand the boundaries and limitations which this degree of poverty imposes. Again, our creduly materialistic philosophy makes us liable to see only "the material opportunities" (to use the words of the White Paper which I have already quoted) and to overlook the immaterial factors. Among the causes of poverty, I am sure, the material factors are entirely secondary--such things as a lack of infrastructure. The primary causes of extreme poverty are immaterial, they lie in certan deficiencies in education, organization, and discipline.

Development does not start with goods; it starts with people and their education, organization and discipline. Without these three, all resources remain latent, untapped, potential. There are prosperous societies with but the scantiest basis of natural wealth, and we have had plenty of opportunity to observe the primacy of the invisible factors after the war. Every country, no matter how devastated, which had a high level of education, organization , and discipline, produced an "economic miracle." In fact, these were miracles only for people whose attention is focused on the tip of the iceberg. The tip had been smashed to pieces, but the base, which is education, organization and discipline was still there.

Here, then, lies the central problem of development. If the primary causes of poverty are deficiencies in these three respects, then the alleviation of poverty depends primarily on the removal of these deficiencies. Here lies the reason why development cannot be an act of creation, why it cannot be ordered, bought, comprehensively planned: Why it requires a process of evolution. Education does not "jump"; it is a gradual process of great subtlety. Organization does not "jump"; it must gradually evolve to fit changing circumstances. And much the same goes for discipline. All three must evolve step by step, and the foremost task of development policy must be to speed this evolution. All three must become the property not merely of a tiny minority, but of the whole society.

If aid is given to introduce certain new economic activities, these will be beneficial and viable only if they can be sustained by the already existing educational level of fairly broad groups of people, and they will be truly valuable only if they promote and spread advances in education, organization, and discipline. There can be a process of stretching--never a process of jumping.

If new economic activities are introduced which depend on special education, special organization, and special discipline, such as are in no way inherent in the recipient society, the activity will not promote healthy development but will be more likely to hinder it. It will remain a foreign body that cannot be integrated and will further exacerbate the problem of the dual economy.

It follows from this that development is not primarily a problem of economists, least of all for economists whose expertise is found on a crudely material philosophy. No doubt, economists of whatever philosophical persuasion have their usefulness at certain stages of development and for strictly circumscribed technical jobs, but only if the general guidelines of a development policy to involve the entire population are already firmly established.

The new thinking that is required for aid and development will be; different from the old because it will take poverty seriously. It will not go on mechanically, saying: "What is good for the rich must also be good for the poor." It will care for people--from a severely practical point of view. Why care for people? Because people are the primary and ultimate source of any wealth whatsoever. If they are left out, if they are pushed around by self-styled experts and high handed planners, then nothing can ever yield real fruit.

SESSION LVII

Compost Heap - Insect Collection - Light Gaps

Total Time: 2 hours 20 minutes

Goals:

- To observe the results of the compost heap, prepared the first week.
- Use compost as top dressing (mulch in nursery).
- To aid trainees in obtaining a better understanding of tropical foresty dynamics.
- To give trainees familiarization and practical experience in the collecting of insects (for purposes of sending in insect/pest identification and possible control measures).

Overview

During this session, three unrelated technical forestry exercises are undertaken. The compost heap started in week one is now ready for use. Trainees need to know the best way for collecting insects for identification and pest control measures. Lastly, light gaps, a key to tropical forest dynamics, is a process of which trainees need to be aware.

Exercises 1. The compost heap
2. Light gaps lecture
3. Insect collection and identification.

Materials: Flip charts, marker pens, tape, compost heap (four weeks +) clear glass bottles (four ounces and under), alcohol, plastic bags (hand size).

Exercise I Compost Heap

Total Time: 1 hour

Overview

Composting is any process which facilitates or speeds up the natural break-down process of decomposition. One of the trainees who has started a compost heap in the first days of training now presents a lecture. The trainees then go to the compost heap. Using compost as mulch for the seedlings, the trainees spread it on seed beds.

Procedures

Time	Activities
½ hour	1. Trainee who has started compost heap as special project gives lecture on starting compost heap. Answers questions from other trainees (See "The 30 Day Hot Compost System").
½ hour	2. Trainees now go to compost heap and (if ready), it can be used as mulch for seedlings in the river that they planted during the first week.

THE 30 DAY "HOT" COMPOST SYSTEM

Composting is any process which facilitates or speeds up the natural breakdown process of decomposition. There are many forms of composting; some involve combining many types of materials that require long periods of time to break down. Times vary from three weeks to several years. The method that will be covered here is a 30 day or "Hot Compost" method. This is a system using high temperatures (up to 170°F) and frequent turnings to achieve a fast usable compost in 30 days. Several advantages to using Hot Compost include:

1) high temperatures eliminate weed seeds, disease and insect eggs,

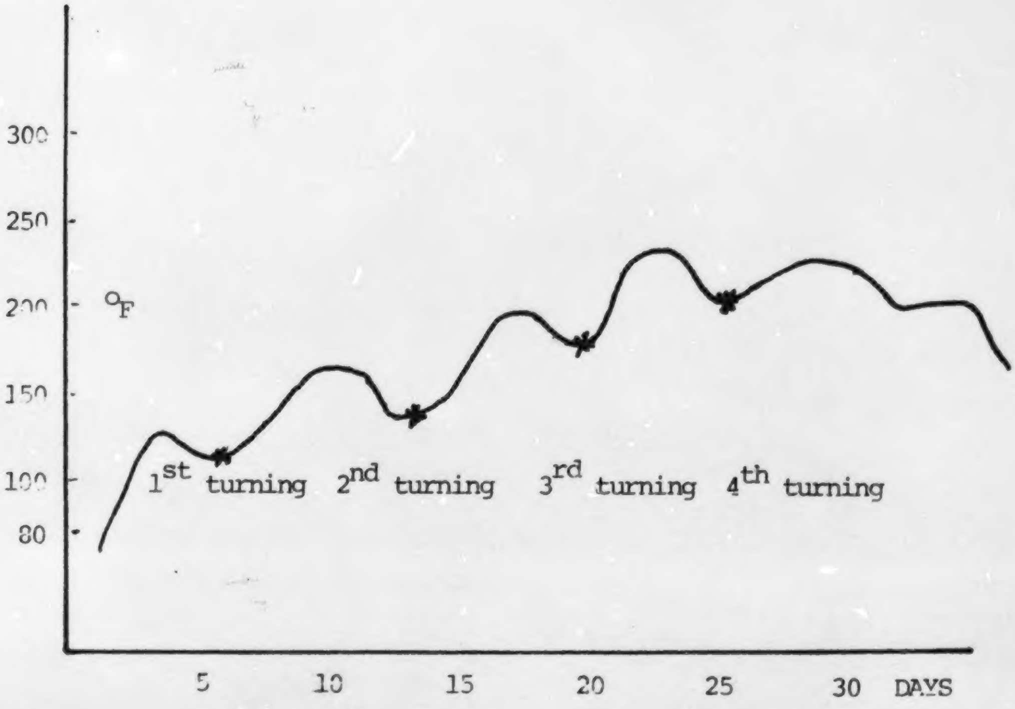
2) quick usable compost is available in just 30 days.

Many believe that composting is a complicated and time-consuming process. This assumption can be over-come if a couple of basic principles are understood.

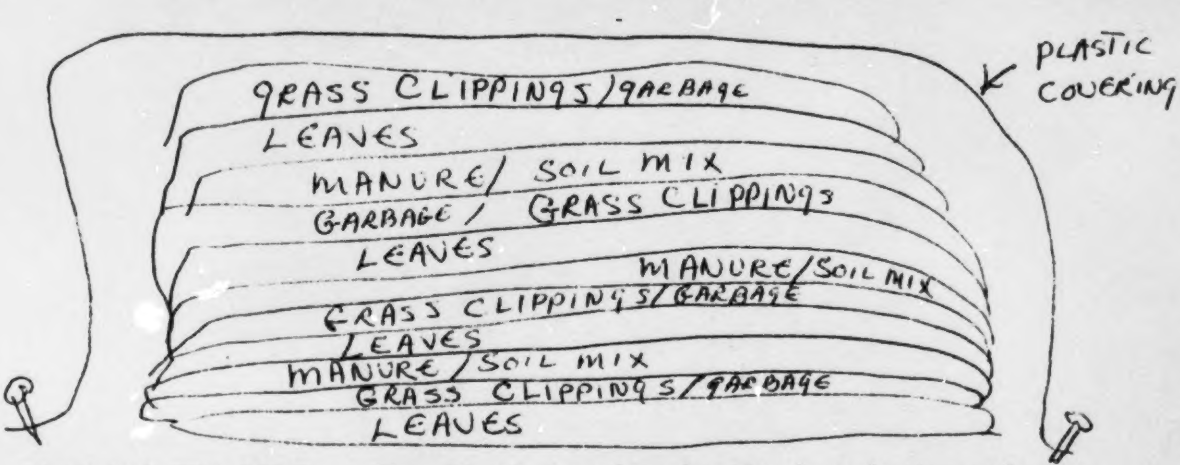
(1) A hot compost has to be properly mixed with the correctly matched materials. In other words, don't just toss in any

old thing. While putting together a compost pile a helpful guideline to remember is the "Carbon:Nitrogen" ratios. The C:N ratio is the amount of brown or dried stalky materials (carbon source) that are mixed to the amount of green leafy or fresh materials (nitrogen source). A well balanced compost pile usually has a C:N ratio of 1:12 (1 part carbon to 12 parts nitrogen). It is important to maintain this ratio because a pile with too much carbon-containing materials and not enough nitrogen just will not heat up to achieve the 170° F temperature you want in your compost. A pile with too large or a disproportionate amount of nitrogen means nitrogen lost needlessly to the atmosphere in the form of NO_2 gas (ammonia). Organic materials high in nitrogen are any type of fresh green material (i.e., fresh grass clippings, fresh young weed cuttings) or any type of animal manure; the best or "hottest" being chicken manure. Another source is kitchen scraps: coffee grounds or waste seeds (i.e., grape seed are especially hot). Materials high in carbon are usually brown dryed plant materials (i.e., leaves, dryed grass or straw, dryed weeds, saw dust or wood shavings).

(2) Watch compost pile temperatures. Get a good soil thermometer to measure temperatures. One with a long stem is most useful. A good pile will heat up to 110°F within 24 hours of being mixed. Within 3 days it should be up to 125°F. If it does not heat up within the first 3 days take it apart and start over. Each time the pile temperature begins to drop (every 4 - 5 days) it will be time to turn and mix the pile again. After a while the pile will not heat up more than 100-110°F no matter how much you mix it. At this point the compost can be used as is or may be left till it achieves a fine crumbly texture.



(Fig. 72)



(Fig. 73)

(3) TURNING THE PILE. The first turning is the heaviest, and most time-consuming, but if it is done right the rest will be easy. Once the pile is put together and has heated up correctly to 120°F or so it might maintain this temperature until about day 5 or 6, then will begin to drop. At this point, take a pitch fork and move the pile. While rebuilding it, mix all the materials that were on the outside into the center of the pile, so that they will heat up this time. Also break up large pieces of organic material with a machete or maddock so they will be broken down quickly. After this first turning the mixing should not involve anything more than a ½ hour of tossing the pile from one spot to another with a pitch fork and shovel.

(4) The time to think about the amount of moisture percentage in the pile is while your are putting it together. Sometimes a pile will not need any added water other than the natural moisture contained in the compost material. An example of this would be fresh green materials (grass clippngs). A good rule of thumb for determining correct moisture content in the pile is that the material should feel like a squeezed out sponge. It should not, however, release water if very tightly squeezed. If water is required it should be judiciously applied to each layer as the pile is being built, rather than watering it from the top after the pile is all put together. Remember: too much water can drown a pile and not enough water can retard bacterial growth and the pile will not heat up.

(5) AIR: Composting is an aerobic process. Soil microbes need oxygen to develop. Try to avoid building the pile higher than four feet, otherwise poles layered horizontally in the pile will be required to aid air circulation. Care should also be taken while building the pile to ensure that fine materials (i.e., grass clippings) are not layered too thickly, to prevent matting which will form a barrier to air circulation.

PUTTING IT ALL TOGETHER: Start the pile with a 5 inch thick layer of leaves to provide good drainage. Next layer should be 2" of grass clippings, loosening it up to keep it from matting down. On top of this sprinkle a mixture of top soil and organic manure. This will increase the nitrogen content some and inoculate the pile with soil microbes (the power house of the compost pile). If kitchen scraps are available they can also be added here. Water each layer lightly - if needed. Now repeat the whole process until all your materials are used up.

Compost is the back bone of my nursery and home garden. Once you begin to use it, it becomes invaluable. Be patient. I have yet to meet the person whose first pile heated up properly. But with time and practice, you can expect much in return for little invested.

Peace Corps Volunteer Bob Simeone
authored the above section.

SESSION LVII

Insect Collection

Total Time: 50 Minutes

Overview

Trainees need to know the proper methods of collecting insects for identification. In addition, trainees need practical experience in collecting insects for the purpose of sending in insects for pest identification and possible control measures.

Procedures

Time | Activities

1. Trainee who has taken insect collection as a special project presents a brief lecture and demonstrates insect collection, using the following procedure:

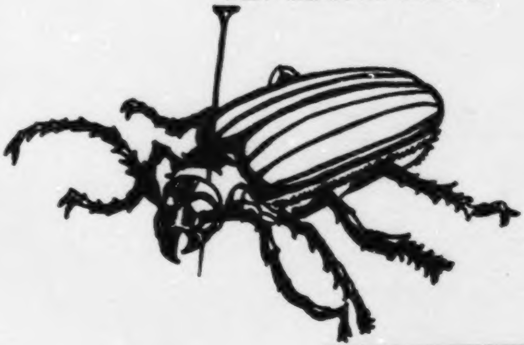
   A. Catching

      1. with hands and plastic bags,
      2. coffee jars with alcohol,
      3. killing jars with acetate,
      4. KCN (not recommended), — 20 minutes
      5. insect collecting net made using a stick, a coat hanger and a piece of mosquito netting.

   B. Preserving

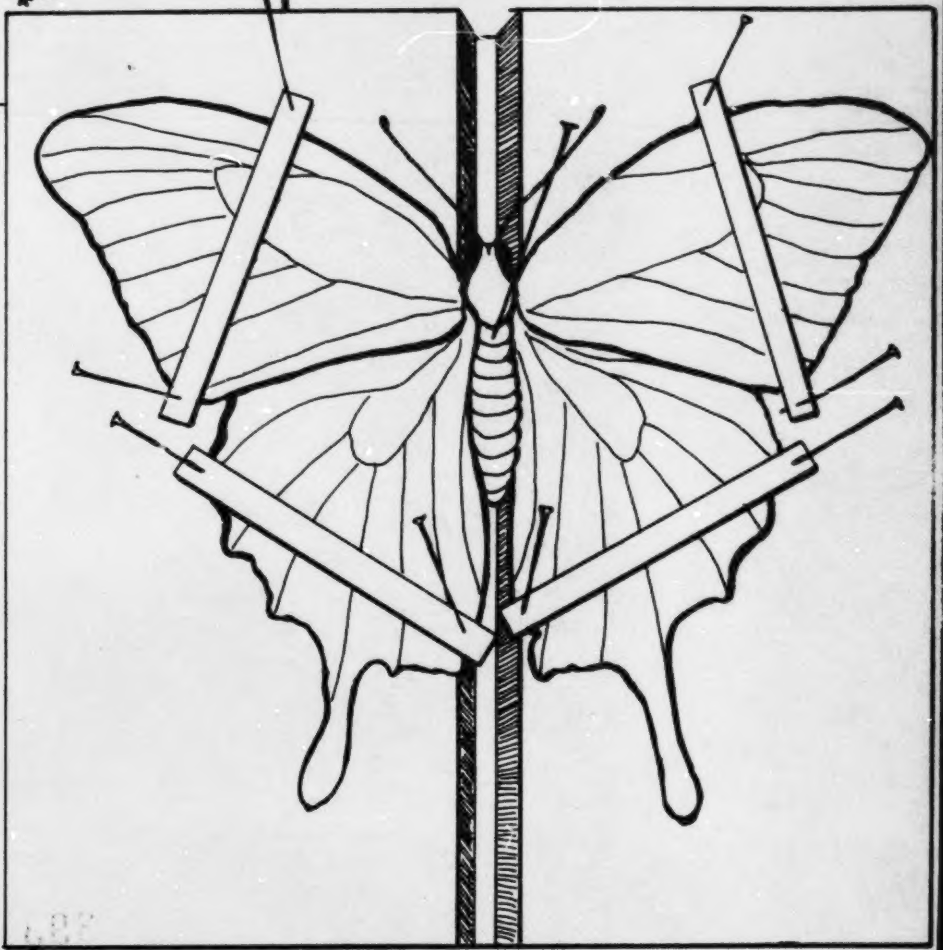
      1. mounting with pins,
      2. paints on pins for small insects,
      3. mounting butterflys (spreading wings),
      4. in glycerine, alcohol or formaldehyde,
      5. accompanying the insect specimen, the date, location and name of collector should be noted. This is often put on a small piece of paper which is placed on the pin mounting the insect.

2. Trainees now go outside and practice collecting insects. They use only glass jar with alcohol method during this exercise. — ½ hour

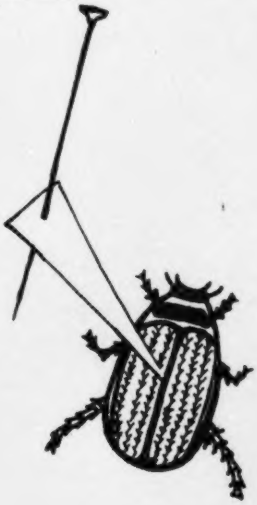


PIN THROUGH THORAX

FOR BUTTERFLIES AND MOTHS: 1) use mounting board, 2) pin behind head, 3) pin strips of paper over wings



For insects less than
6 mm long.....
...glue point to bottom of thorax



(Fig. 74)

Exercise III Light Gaps

Total Time: 20 minutes

Overview

This short lecture is to give trainees a better understanding of more of the dynamics of the tropical forests.

Procedures

Time	Activity
20 minutes	1. Technical trainer gives lecture using following outline.

OUTLINE - Light Gaps

Light gaps	one of the most important keys to understanding tropical forest dynamics. Large trees fall over and knock down other trees with them resulting in a gap in the forest canopy (light gap). In these gaps, surrounding trees wil spread their crowns out horizontally at the same time pioneer species or light gap species will take advantage of these openings and will begin rapid growth.
Gap species	could be existing seedlings in the understory or viable seeds in the forest which could germinate.

With the falling over of a large tree, several different micro-environments are created:

(1) exposed minerals in the soil where the tree was rooted.
(2) roots of the tree with atttached soil.
(3) surrounding areas opened to sunlight.
(4) dense, large areas where the tree crown is laying on the ground.

Different species will occupy each of these different environments.

A further study of light gaps and their relation to the dynamics of a tropical forest will enable us to better our understanding and our ability to develop workable forest management plans for tropical forests.

SESSION LVIII

Spanish Language

Total Time: 1½ hours

Overview

In this session trainees continue to present charlas. Each trainee should have two charlas which they can present, time permitting.

Procedures

Time	Activities
5 minute presentation	1. Each trainee is to give a full 5 minute charla on some aspect of forestry.
10 minute feedback to each charla presenter	2. Each participant is given feed back on content, pronunciation and manner in which they presented charla.

SESSION LXIX

Exercise I   Cultural Shock - Are we Ready for It?

Total Time: 2 hours

Overview

In the process of getting trainees ready for volunteer service and with the realization that many participants will in a few short days be alone for the first time in their project sites, we once again go over the process of cultural shock.

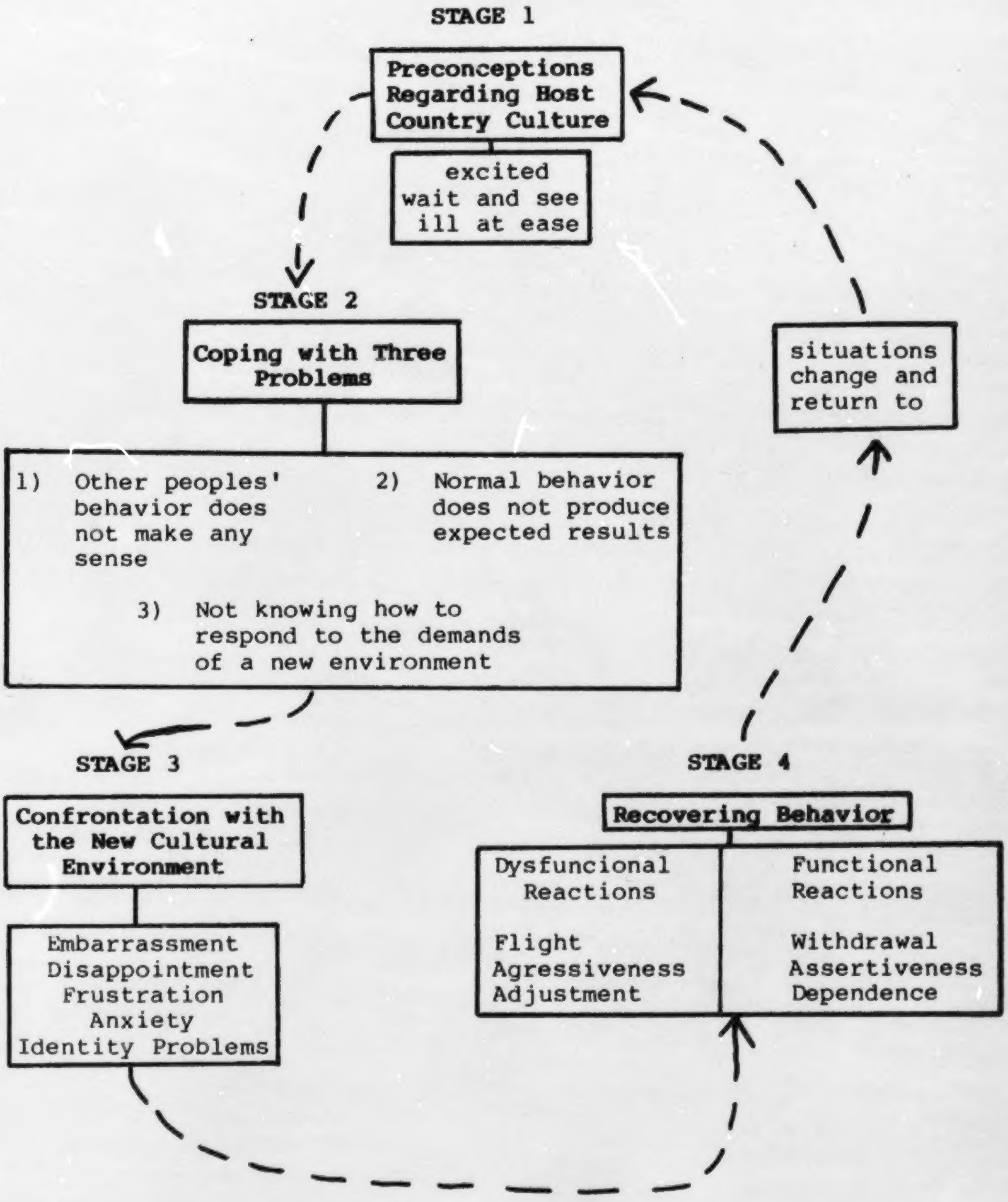
Procedure

Time		Activities
10 minutes	1.	Trainer gives brief introduction and goes over goals. Reminds trainees that this subject has been covered before, but now they are almost ready to go to their sites for two years of volunteer service. We should then go over the following stages.
	2.	Trainer using the following diagram posted on newsprint asks trainees to break into groups of five or six and discuss each stage. They should discuss the following:
10 minutes	A.	Ways to cope with the problems in stage two.
10 minutes	B.	Feelings that will be generated during stage three.
10 minutes	C.	The inevitable reactions in stage four.
20 minutes	D.	Trainer now hands out to the group, fears and hopes form, and they make list of fears and hopes.
20 minutes	E.	Trainer now hands out "check list" for fears and hopes. Trainees discuss their lists using check list.
5 minutes/ group	F.	Each group is asked to prepare a statement to give to the large group. This presentation should include highlights of small group discussion and points they would like to stress.

15 minutes

G. Trainer now does summary of exercise. Picks up points that have been raised during presentation. May add some of own experiences which are appropriate to alleviate fears that have been raised.

THE CULTURE SHOCK PROCESS


STAGE 1
Preconceptions Regarding Host Country Culture
excited
wait and see
ill at ease
STAGE 2
Coping with Three Problems
1) Other peoples' behavior does not make any sense
2) Normal behavior does not produce expected results
3) Not knowing how to respond to the demands of a new environment
STAGE 3
Confrontation with the New Cultural Environment
Embarrassment
Disappointment
Frustration
Anxiety
Identity Problems
STAGE 4
Recovering Behavior
Dysfuncional Reactions
Flight
Agressiveness
Adjustment
Functional Reactions
Withdrawal
Assertiveness
Dependence
situations change and return to

(Fig. 75)

CHECK LIST FOR FEARS AND HOPES

1. Are the fears and hopes realistic or not? (Let's find out through concrete examples).

2. What is the cultural dimension of each fear and hope? (From where are those fears and hopes coming?)

3. What can be done to overcome the fears if necessary and build upon the hopes?

    a) the anticipated negative responses from others: are they real or imaginary?

    b) the obstacles which prevent the implementation of what people wish to do but do not do.

    c) the required modifications for making the ideas acceptable?

FEARS

1. to fail
2. to be misunderstood
3. to hurt people
4. to lose face
5. to be rejected

Others

HOPES

1. to learn something
2. to grow from the experience
3. to adjust
4. to help others
5. to be successful

Others

Grafting and Fruit Trees

Total Time: 3½ hours

Goals:

- To acquaint foresters with fruit tree care and grafting techniques.

Overview

Foresters are often expected to be experts in all trees including fruit trees - so it is important to be aware of fruit tree culture.

Exercise I: Lecture on fruit trees and grafting practice.

Materials:
Fruit trees for thinning, grafting,
sharp knife,
sharpening stone,
plastic tape (grafting tape),
bees wax.

SESSION LX

Exercise I Lecture on fruit trees and grafting practice.

Total time: 3½ hours

Overview

In this exercise trainees learn about fruit trees and fruit tree reproduction.

Procedures

Time	Activities
	1. Trainer gives the following lecture on fruit trees.

Grafting and Fruit Trees

FRUIT TREES AND FORESTRY

Foresters are often expected to be experts in all kinds of trees including fruit trees - so it is important to be aware of some of the basics of fruit tree culture.

I. Differences between forestry for wood products and for fruit

   A. Short term, usually annual production cycle.

   B. Intensive cultural practices; fertilization, pruning, grafting, disease and pest control.

   C. In summary, fruit trees are domesticated trees needing a series of special treatments.

II. Critical Cultural Practices in detail

   A. Pruning

      1. Specific systems vary according to the crop

      2. Some basic rules are generally valid

         a. space for every branch and a branch for every space.

         b. watch the timing - generally in the lowest growth period (dormancy) of the tree.

         c. prune in a way that the tree can heal over - clear cuts, no projecting stumps - so that rain will not collect in the cut.

   B. Grafting

      1. What?- The union of the cambium layers of a parent tree (stock) and a desired variety (scion) in such a way that the two form a solid, growing unit.

         a. continued growth from the scion is true to the scion's characteristics and is not a combination of stock and scion.
         b. essential to protect grafts of all types with wax and/or by wrapping to prevent drying out or mechanical damage.

      2. Why?

         a. to achieve desired variety of fruit with root stock adapted to local conditions.

b. to gain time - multiplying a desired variety; faster than plants from seeds.

c. to assure genetic purity.

d. to have several varieties on one tree for pollination purposes.

e. for repair purposes - renewing an old tree or repairing girdled trunks - rodents or mechanical damage.

3. When? - Beginning of the growth period.

4. Types

a. top working - renewing of a tree

- o cleft graft,
- o whip graft,
- o bark graft.

b. repair

- o bridge graft

c. budding

- o most practical and reliable,
- o demonstrations and practice of cutting bud shields,
- o T-cuts, inserting and wrapping.

3 hours 2. Trainer now demonstrates grafting technique and trainees practice techniques.

Trainer's Note: During pilot we were able to arrange for some trainees to observe beekeeping during this same time. We gave trainees the choice between fruit tree grafting and beekeeping.

SESSION LXI

Spanish Language

Total Time: 1½ hours

Overview

In this session the writing of letters to officials is covered.

Procedures

Time	Activities
1½ hours	1. Instructor goes over letter forms and trainees draft short letters that they may need to use.

SEE FOLLOWING GUIDELINES FOR WRITTEN COMMUNICATIONS IN SPANISH

ASDELA - Centro de Entrenamiento

Some Guidelines for Written Communications in Spanish

In Latin America written communications are very important and the form used should follow accepted local patterns.

There are several aspects in formal communication that should be watched closely. Some of them are:

1. Titles: Be careful to find out the correct official title of the person to whom you are writing.
2. Hierarchy: Be careful to respect the levels of authority within the organization being approached.
3. "Tuteo": Be careful with informal usage. It is always safe to use "Usted".

What follows are sample letters at various levels of formality. In each case some alternative forms of openings and closings are provided.

In every case of sending a formal communication it is highly recommended to have your draft letter reviewed by a school teacher, business person or some knowledgeable person who would be able and willing to correct your letter and put it into appropriate local terms.

MODELO DE CARTA

Quito, 27 de noviembre de 1981

Señor Ing.
Celso Minuche S.
Jefe del Departamento de Investigación
de Sitios
Ciudad.-

Apreciado Celso:

Luego de saludarte y desearte èxito en tu trabajo paso a comunicarte que he visitado los lugares posibles para la iniciación del vivero en la zona. Para decidirlo definitivamente te propongo un viaje de reconocimiento, al cual yo podria acompañarte para hablar sobre las ventajas y desventajas que he visto. El sitio se llama "El Pedregal" en el km. 5 de la via a Pajàn.

Espero tu respuesta para concretar la fecha de visita al sitio.

Tu amigo,

Roberto Smith

Portoviejo, 27 de noviembre de 1981

Señor Ingeniero
Raúl Pérez Calderón
Representante local del MAG,
Jefe Regional
Ciudad.

Estimado Señor Ingeniero:

Yo, William Smith, Voluntario del Cuerpo de Paz, actualmente Técnico Forestal en el proyecto de Forestación de la Zona de Portoviejo, Provincia de Manabi; me permito solicitar a Usted, se digne aprobar el presupuesto que es necesario para realizar un proyecto de investigación forestal en la zona.

Dicho presupuesto ha sido ya presentado a usted en fecha anterior.

Por la amable atención que se sirva dar a la presente solicitud, le anticipo mis agradecimientos.

Muy atentamente,

William Smith

Nota: Mi dirección es:

William Smith
Casilla 24
Portoviejo

MODELOS DE SOLICITUD

Quito, 28 de noviembre de 1981

Señor Ingeniero

Ministro de Agricultura y Ganadería
Quito.

De mis consideraciones:

Por medio de la presente y consciente de su interés en el desarrollo agrario del país, me permito invitarlo muy cordialmente a la inauguración del vivero forestal que se realizará en el Centro de Forestación de Conocoto, el día lunes 14 de diciembre a las 10 de la mañana.

Seguros de que su presencia dará realce y solemnidad a este acto, le anticipo mis más sinceros agradecimientos.

De Ud. muy atentamente,

Lcdo. Marco Jackson
Voluntario del Cuerpo de Paz

ESQUEMA DE UNA SOLICITUD

FECHA: LUGAR, DIA DE MES DE AÑO

1. - ENCABEZAMIENTO:

   - Titulo
   - Nombre
   - Cargo o función
   - Lugar

2. - SALUDOS

   - De mis consideraciones:
   - A quien corresponda:
   - Muy Señor Mio:
   - Estimado Señor:
   - Muy Señores Nuestros:

3. - ASUNTO O CUERPO DE LA SOLICITUD.

4. - AGRADECIMIENTO:

   - Por la favorable acogida que se digne dar a la presente le anticipo mis agradecimientos.

   - Por la atención que se sirva dar a la presente le reitero mis agradecimientos.

   - Le agradezco de antemano por la favorable acogida que se digne dar a la presente.

   - Agradeciéndole sinceramente.

   - Por la atención que se digne dar a la presente, me suscribo de Ud. muy atentamente, Quito, lo. de diciembre de 1981

Señor Doctor
John Williams
Director de Catholic Relief Service
Quito

De nuestras consideraciones:

La Cooperativa Agrícola del Pueblo de.......................... Canton......................., Provincia de.............., integrada por ciento cincuenta socios, está empeñada en realizar un proyecto comunal de forestación que cubrirá 10 hectareas de ésta localidad. El proyecto incluye una serie de areas que beneficiarán a los miembros de la cooperativa y a la comunidad. Tales proyectos son:

- Empleo de las áreas desocupadas, prevensión de la erosión que amenaza nuestras tierras.

Por tal motivo y conocedores de su alto espíritu de colaboración que anima a la institución que tan acertadamente la dirige, solicitamos su atención con el fin de que nos proporcione apoyo económico, ya que nuestra comunidad carece de los medios necesarios para llevar a cabo dicho proyecto.

Para una mejor comprensión de nuestro proyecto, adjuntamos a ésta, los detalles del plan de forestación de nuestra cooperativa.

Por la favorable acogida a la presente, le anticipamos nuestros mas sinceros agradecimientos.

De Usted, muy atentamente

Javier Núñez
Gerente de la Cooperativa

Marcelo Rojas
Secretario de la Cooperativa

SESSION LXII

Professional Approaches to Interaction with Host Country Officials

Goals:

- To help trainees adopt a professional demeanor when interacting with host country officials.

Overview

In this session trainees will practice interacting with host country officials in a professional manner.

Exercise I: Role Play

Materials: flip chart, marker pens, tape.

SESSION LXII

Exercise I: Role Play

Total Time: 1½ hours

Overview

Through a series of role plays and the processing of those role plays, trainees will come to understand the importance of interacting professionally with host country officials

Procedure

Time	Activities
	1. Trainer introduces a series of role plays and trainees take on roles of volunteers to practice professional interactions.
	2. The important part of this exercise is the processing.

Trainer's Note: Role plays that follow are samples. You may want to write your own based on actual people.

Role Plays

Bruce (1)	MAG official is pro-U.S. and anti-communist. He is in favor of U.S. invading Cuba, Nicaragua etc., to stop the spread of communism. He sees PCV as anti-communist. Criticizes U.S. for its weak foreign policy (does not bomb Cuba, etc.).
(1)	Volunteer - this is your first visit to MAG official who will be your contact for your job.
Bruce (2)	MAG official is leftist. U.S. is inflicting misery and capitalism on poor people in Third World countries. U.S. is sending PCVs to Third World countries as spies to influence public opinion in these developing nations. (PC and CIA are both run by the State Department).
Joan & Bruce (2)	Counterpart & PCV arrive at MAG office. Counterpart and MAG official are old friends, with family ties, etc. PCV is completely ignored.
Gene & George	Established PCV arrives at MAG office. He has been working two years with MAG official and is good friends with him. MAG official lets it be known that he is worried about new PCV - who is quiet, immature, and speaks little Spanish.
Gene	Female PCV comes to visit MAG official. He makes pass at PCV trying to get her to commit to meeting later, going to dance or dinner together.
Francisco	PCV Visits MAG official for first time. MAG official is nice, very helpful and interested in work plan of PCV. He offers assistance and help in getting PCV to work on project.
Francisco	PCV visits MAG office for first time. MAG official interested in agricultural crops and tries to exclude any reference to planting forest trees. Tries to get PCV to help in planting potatoes and onions for MAG official's personal use.

Final Interviews

Total Time: 2 hours

Goal:

- To conduct final interviews with trainees.

Overview

This is the final interview with trainees. Last chance for coaching. Trainees will definitely be praised for good work and positive skills.

Procedures

Time	Activities
2 hours	1. Same as other interviews except trainers may choose which trainees to interview. It is suggested that those trainers with whom trainess identify most closely interview those trainees.

SESSION LXIV

GRADUATION

Total Time: 2 hours

Overview

During pilot program Certificates of Completion of Training were awarded to trainees by host country Forestry Director.

Procedures

Time	Activities
	1. To be arranged

Trainer's Note: We allowed trainees to design their own graduation exercise. We had the host country Director of Forestry speak in addition to the Peace Corps Country Director, and the Agricultural Attaché from the U.S. Embassy. Two trainees gave short speechs of "thank you."